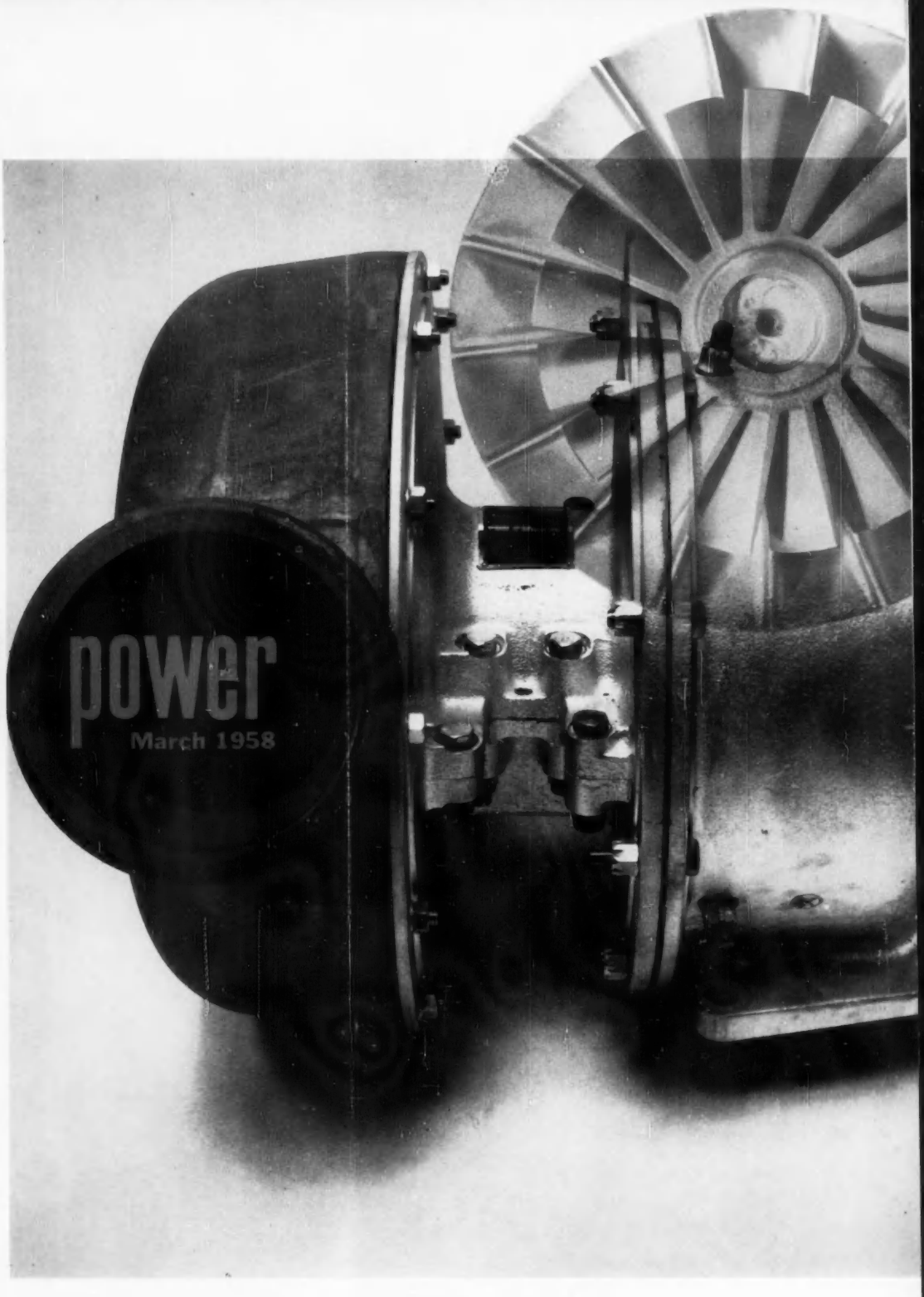
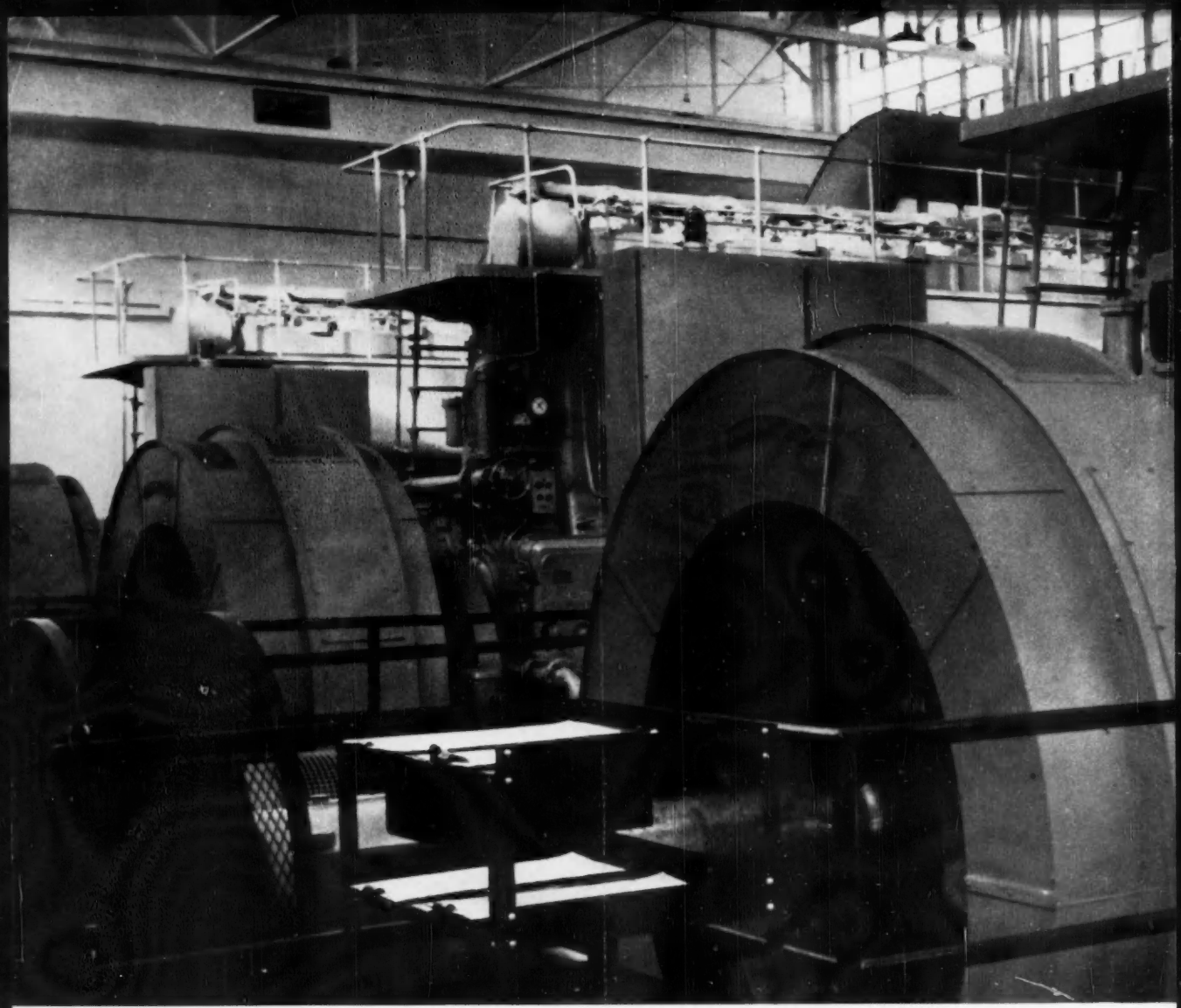
diesel power

March 1958



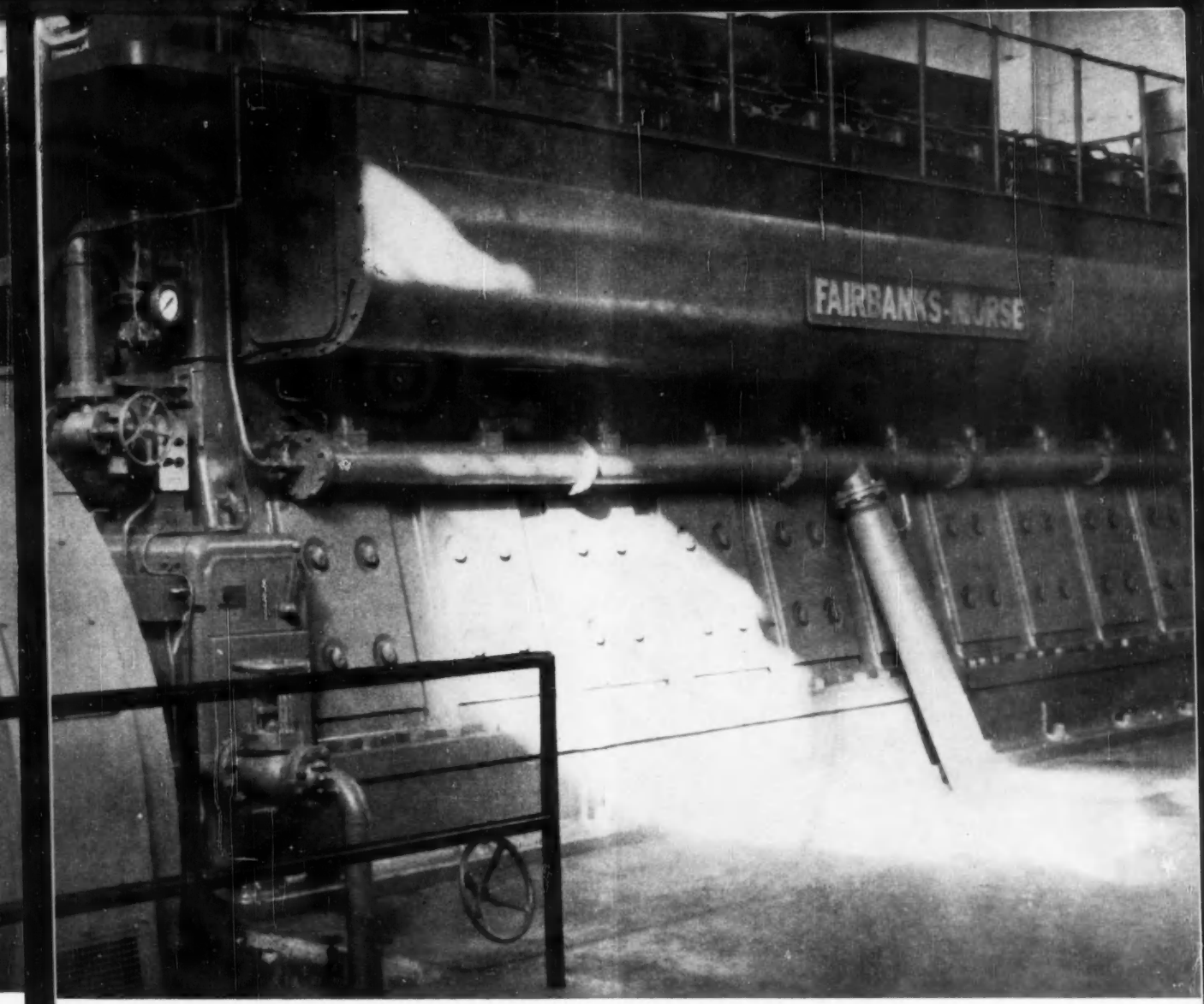


4 reasons why cost-specify TEXACO

Increasing the output of the individual engine is one way to hold the line on rising operating costs. And effective lubrication can play a major role in increasing diesel efficiency. That's why more engineers are specifying Texaco Ursa Oil Heavy Duty for optimum diesel operation. Here are the reasons:

- **Keeps engines clean.** Texaco Ursa Oil Heavy Duty is fully detergent and dispersive, resists oxidation.
- **Keeps rings free** for full compression and complete combustion.
- **Increases parts life.** Bearings, pistons, liners all last longer with Texaco Ursa Oil Heavy Duty.
- **Reduces cost** of maintenance, minimizes fuel consumption.

Carefully refined and fortified with effective additives, Texaco Ursa Oil Heavy Duty assures *more* power with less fuel over *longer* periods between overhauls. That's why, *for over twenty years, more stationary diesel horsepower in the U. S. has been lubricated with Texaco than any other brand.*



conscious engineers Ursa Oil Heavy Duty

A Texaco Lubrication Engineer will gladly give you full details on the lubrication needs of all diesel, gas and dual-fuel engines. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

☆ ☆ ☆

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

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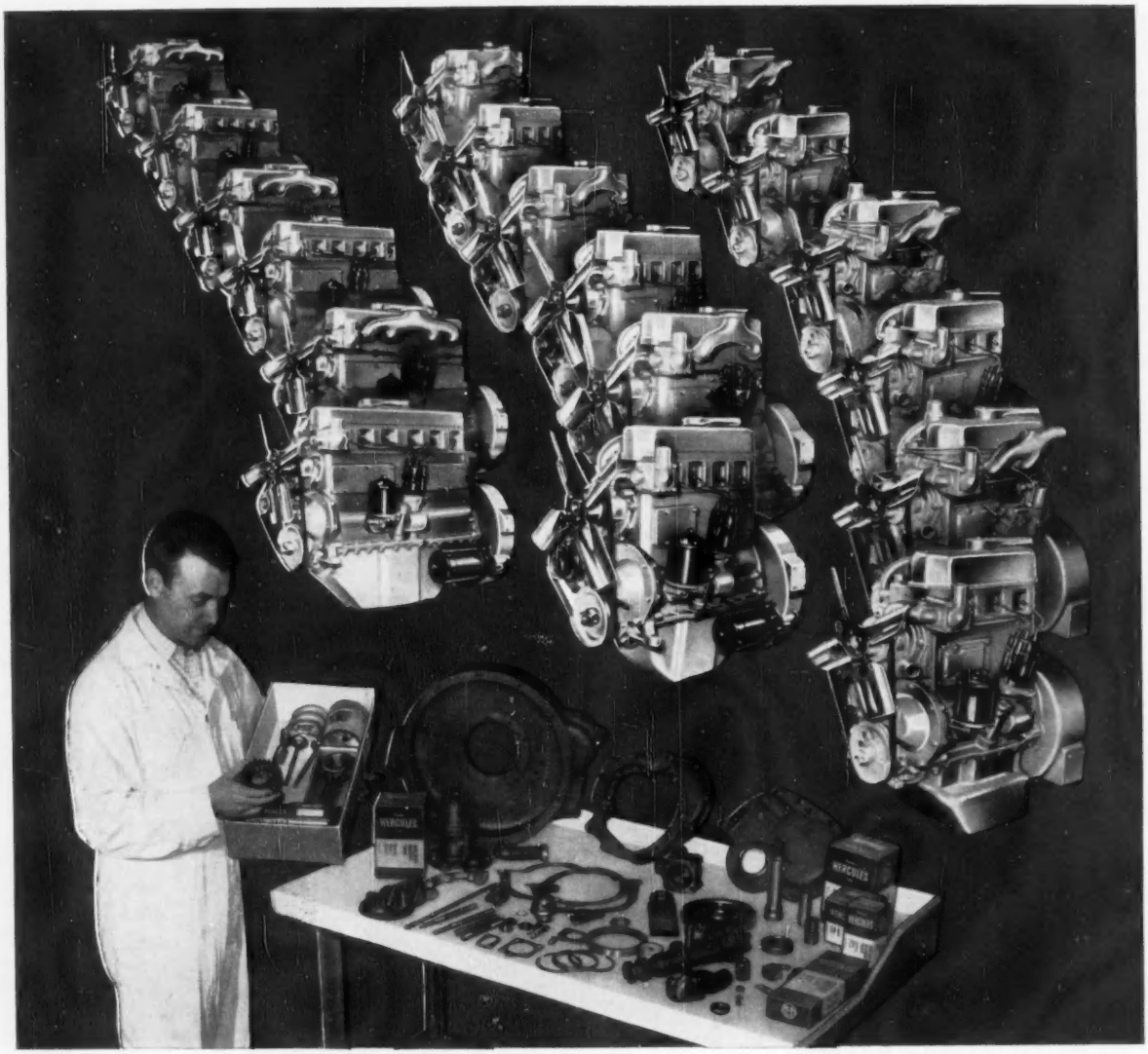
LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

(PARTS, INVENTORY, PRODUCTION, DOWNTIME, MAINTENANCE)



One set of spare parts serves all these 18 HERCULES engines

Here's parts interchangeability to warm a maintenance man's heart! Hercules designed the new DD diesel and GO gasoline engines with the user in mind: succeeded in achieving a unique degree of interchangeability that reduces spare parts requirements for Hercules-powered equipment to a minimum.

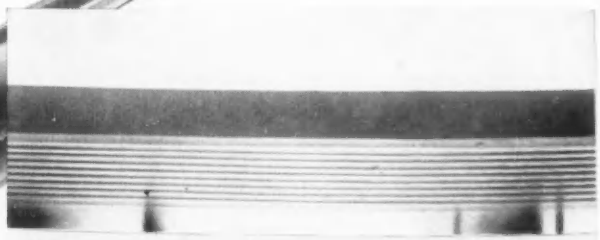
Actually, the illustration above doesn't tell the whole story. To do that, we'd have to show 6 power units as well as all 18 models of 3, 4, and 6-cylinder engines available in the DD and GO series—a total of 24 power plants using many of the same wearing parts!

You can take advantage of this maintenance economy by specifying Hercules diesel, gasoline, or LP-gas power for the equipment you buy. If you'd like the full story on these modern engines, write Hercules Motors Corp., Canton 2, Ohio—or call your Hercules distributor: there's one in the Hercules worldwide network near you.

HERCULES

HERCULES MOTORS CORPORATION
Canton, Ohio

Pedrick chrome rings are Pre-Seated!



Bright highlight along lower face of ring shows pre-seated area from factory lapping.

You have no long break-in period with PEDRICK Chrome Rings. Almost immediately you get the full benefits of the Chrome surface which is practically scuffless, which withstands high temperatures, abrasion and corrosion, and which increases ring life up to four times.

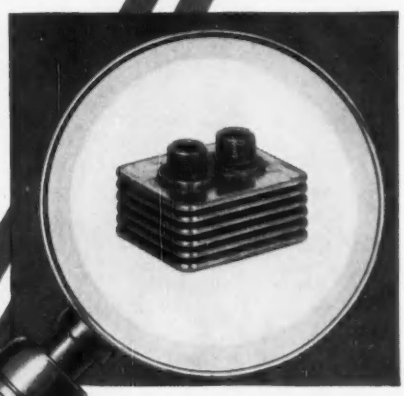
This is so because PEDRICK laps or pre-seats its Chrome rings to cylinder size at the factory. This reduces break-in time up to 80% and enables the engine to be put under full load very quickly, with all the benefits of Chrome. Furthermore, PEDRICK Chrome rings are the most-modern twist-seal or taper-face designs, which in themselves speed seating and assure a quick, positive seal.

So, for the very best in quality, the very latest in engineering design, make your rings PEDRICK. Let our engineers cooperate with you on special problems. Write, wire or phone: WILKENING MANUFACTURING CO., Philadelphia 42, Penna., SAratoga 9-3770.

Pedrick PISTON RINGS

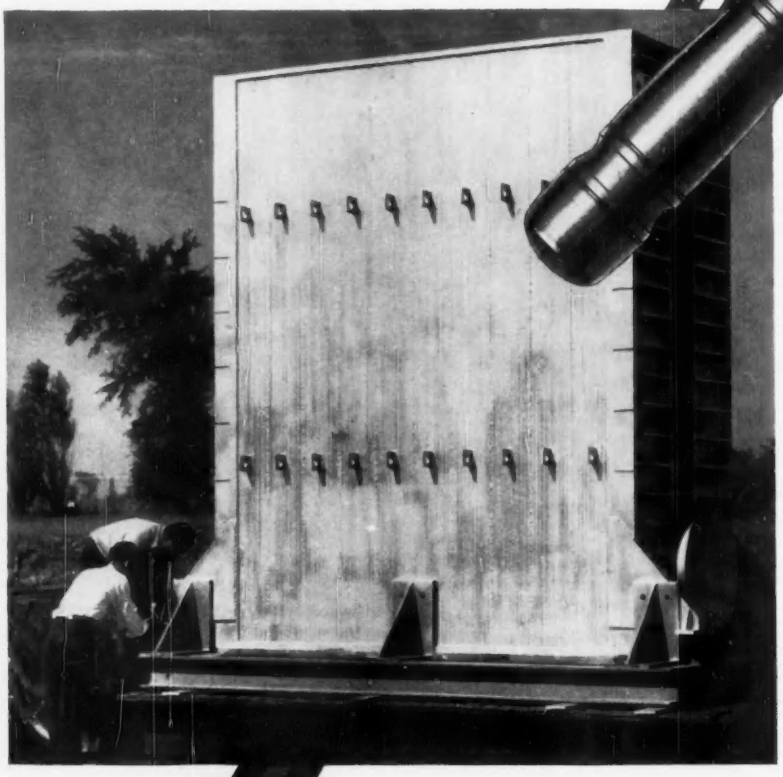
PEDRICK PIONEERED *Conformable* PISTON RINGS FOR BIG-BORE ENGINES

HARRISON SIZES UP THE JOB...



↑

2½ lb. diesel engine heat exchanger



← 58 ton gas turbine regenerator

Meet the large and small of it!
At left is a half section of Harrison's new regenerator for a General Electric combustion gas turbine. The regenerator is used by GE to boost performance and economy on the nation's natural gas lines. The entire unit is approximately 12½ feet high, 10 feet wide and 10 feet deep.

The small but vital marine heat exchanger (above) cools the oil in engine gear boxes. It is less than three inches high, four inches wide and slightly more than three inches deep.

You'll find Harrison heat exchangers on all types of diesel equipment—automotive, marine and industrial. If you have a cooling problem, Harrison has the answer!

TEMPERATURES MADE TO ORDER

HARRISON

FROM THE PROGRESS OF THE PAST... GM ...THE PROMISE OF THE FUTURE

HARRISON RADIATOR DIVISION • GENERAL MOTORS CORPORATION • LOCKPORT, NEW YORK

editors notes...

You'll want to read about...

How a pipeline pumping station is set up for remote control operation (Pg. 14). Capability of centralized control of all stations means more efficient operation and utilization of the pipeline as a whole as well as of the individual stations . . . .

Rail-car performance that offers promise to railroads of solving some of their growing problems in passenger service (Pg. 16). High availability and low-cost performance combine with fast, comfortable service . . . .

A new device, the Diesel-Dial Engine Finder, that is both a reference of all U. S.-built diesels and natural gas engines and a means of solving various problems of selection, application and rating (Pg. 18). Portable, fast and accurate, it will give you the information you need and eliminate tedious calculations . . . .

Details of a mobile power unit of a type finding ever-wider acceptance (Pg. 19). This is one of several headed for Mexico to help supply the growing power need . . . .

How Fairbanks-Morse turbocharged their opposed-piston engine (Pg. 21). The O-P moves higher in the range of high-output engines with big reductions in specific weight and space requirements, plus improved fuel economy . . . .

You'll want to read about...

Cummins' setup for servicing their turbochargers on a nationwide basis (Pg. 24). Rebuilding techniques and tooling are covered, along with ideas on how to avoid turbocharger trouble. Don't miss this timely "Talking Shops" feature . . . .

A full-range, combination diesel-electric and electric locomotive just added to EMD's standard product line (Pg. 30). Potential economies are big where railroad operation requires changing of locomotives due to tunnel and terminal restrictions on use of diesel-electrics . . . .

Some things you should know about starting fluids (Pg. 32). While effective for cold-weather starting, improper use can be dangerous to your engine and to you . . . .

How you can get maximum service life and best performance from PM hydraulic governors (Pg. 34). Investigation of good and bad performance records pinpoints the reasons for failures and what should be done to prevent them . . . .

We know that you're reading the articles and our Departments; our number of inquiries through the the Reader Service card is climbing steadily. Keep it up and we'll keep trying to make them all more valuable to you. Be seeing you.

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BPA

diesel power

Established in 1923 **Vol. 36, No. 3** **March, 1958**

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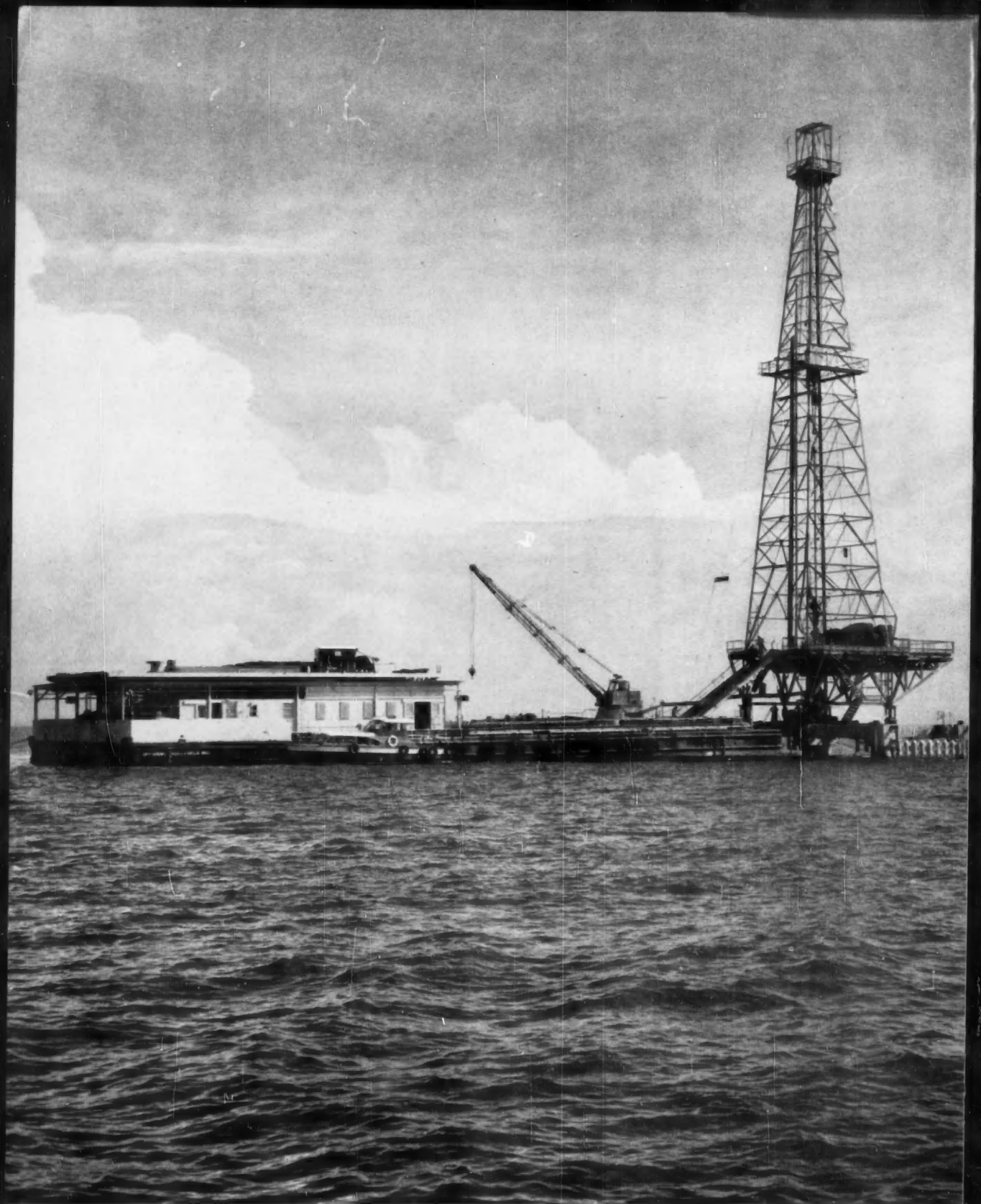

Drilling in Lake Maracaibo is The Offshore Company's new barge V-1. Barge V-2 is also working in this area. These units are the most powerful Diesel-electric rigs yet to work in Venezuela. Each is capable of drilling in excess of 12,000 feet.

The Offshore Company Goes to Venezuela

—picks Electro-Motive Power with overseas service and parts facilities for two new Diesel-electric barges

The Offshore Company, first to use Electro-Motive Power in the United States, is now first to use this Diesel-electric equipment in Venezuela on their new barges, V-1 and V-2.

Each of these modern barges contains Electro-Motive equipment of 2700 horsepower, making them the most powerful Diesel-electric rigs sent to work in the Lake Maracaibo area.

Behind The Offshore Company's choice of power for the new barges was experience with Electro-Motive Power on their record-breaking mobile platforms Nos. 54 and 55 and their fixed platform No. 25. But most important was the knowledge that they could get *local* service for Electro-Motive equipment from General Motors de Venezuela.

Factory-trained personnel head up this facility through General Motors Overseas Operations. It offers the same superior service for Electro-Motive equipment found in the Gulf. Here too, complete facilities are offered for both engine and electrical components—*one responsibility* for the complete power system.

If your interests lie in moderate or deep drilling in this country, Canada, South America, or elsewhere, look into the advantages of Electro-Motive equipment with established world-wide service facilities. See your Electro-Motive representative for details.

ELECTRO-MOTIVE DIVISION
GENERAL MOTORS · La Grange, Ill.

In Canada: General Motors Diesel Limited, London, Ontario
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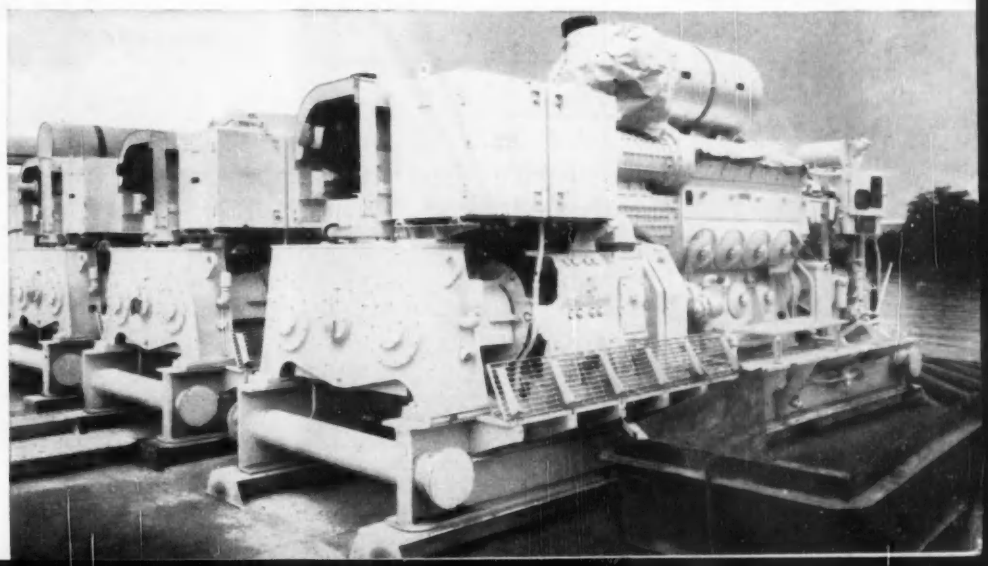
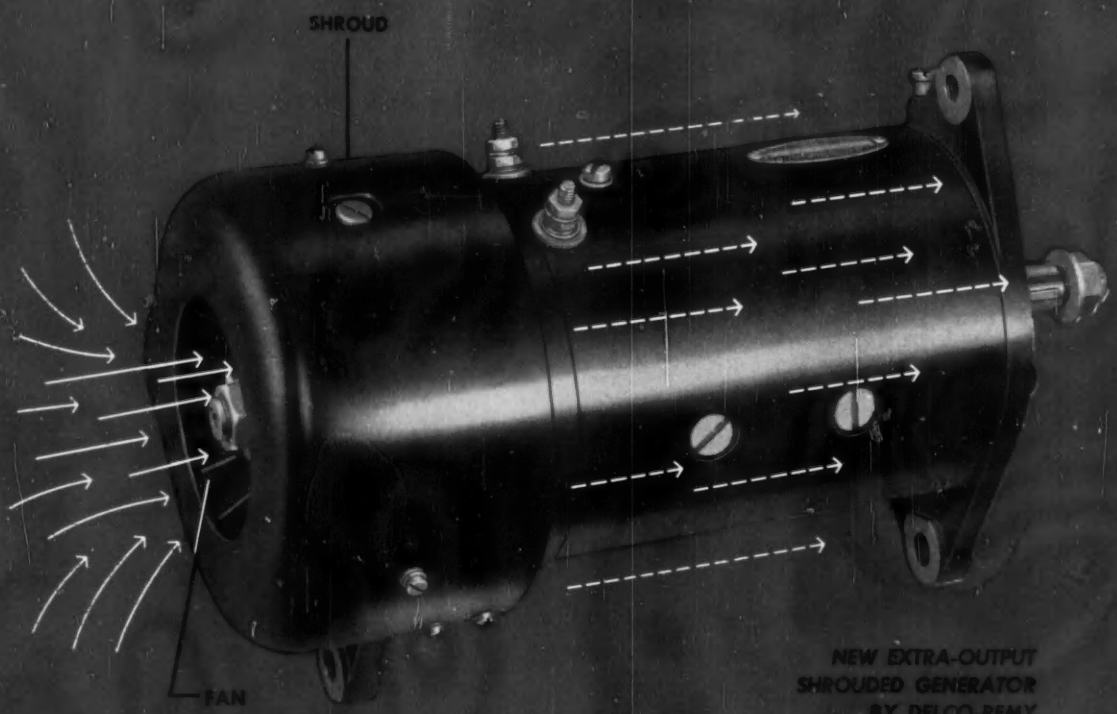
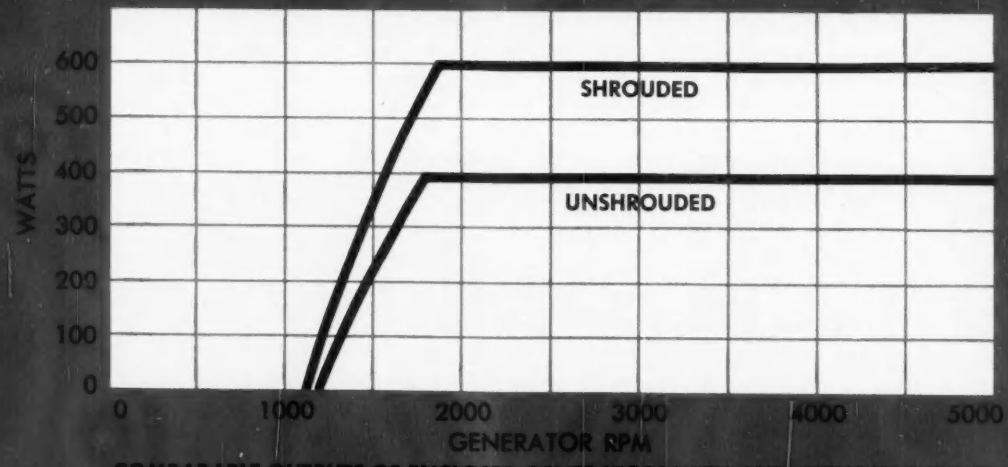


Three Electro-Motive engine-generator sets of 900 hp each supply power to drive motors on mud pumps and draw works. These sets are heat-exchanger cooled. Sets are also available with air cooling or keel-cooling systems.

PROGRESSIVE ENGINEERING MAKES THE DIFFERENCE



NEW EXTRA-OUTPUT SHROUDED GENERATOR BY DELCO-REMY



COMPARABLE OUTPUTS OF ENCLOSED GENERATORS WITH AND WITHOUT SHROUD

NEW DELCO-REMY TOTALLY ENCLOSED GENERATORS OFFER 50% MORE OUTPUT WITHOUT INCREASE IN SIZE

Delco-Remy's new, totally enclosed shrouded generators offer up to *50% more* output than former enclosed models of this size. They are especially designed for construction vehicles and off-the-road equipment subject to extremes of dust and moisture, or corrosive materials. Because they are totally enclosed, they are *splash-proof* and *dust-proof*.

Key feature of the new units is a high-efficiency fan mounted at the commutator end in a compact, formed steel shroud. The shroud-controlled air blast travels closely along the generator frame where it produces rapid and effective cooling . . . makes possible up to *50% more output*, without the added cost of increased frame size.

For every kind of heavy-duty operation, Delco-Remy generators provide greater power and reliability with long life. Be sure to specify Delco-Remy shrouded generators—where required—for your new equipment. Readily available in 6-, 12-, and 24-volt models for replacement application on present equipment through the United Motors System.

DELCO-REMY • DIVISION OF GENERAL MOTORS • ANDERSON, INDIANA

GM GENERAL MOTORS

GENERAL MOTORS LEADS THE WAY—STARTING WITH

Delco-Remy

ELECTRICAL SYSTEMS

OFF THE HIGHWAY...

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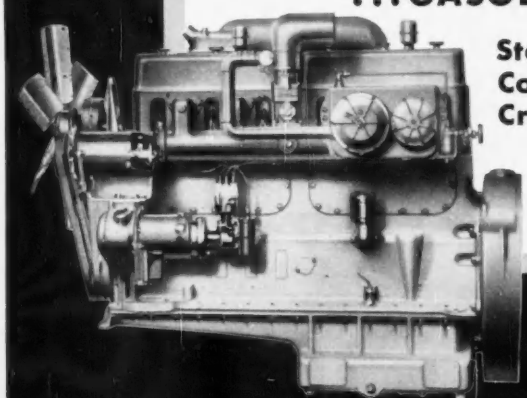
WAUKESHA ENGINES

NORMAL and TURBOCHARGED DIESELS
...GASOLINE...LP GAS

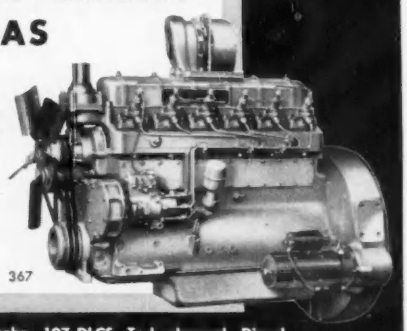


Waukesha WAKB—Equipped for Butane—6-cylinder, 6¼ x 6½-in., 1197 cu. in., 300 max. hp @ 1800 rpm.

Standard or Counterbalanced Crankshafts

Write for descriptive bulletins

367



Waukesha 197-DLCS Turbocharged Diesel (also normally aspirated)—6-cylinder, 4 x 4-in., 302 cu. in., 131 max. hp @ 2800 rpm.

WAUKESHA MOTOR COMPANY
Waukesha, Wisconsin • New York • Tulsa • Los Angeles

Editorially speaking -

For Better Communication

Today, we have no lack of *means* of communication. You can convey ideas by everything from a letter to microwave transmission. We get television programs from Havana and radio messages from a satellite in orbit. In fact, communications technology has advanced faster than the *art* of communicating—*what* to say and *how* to say it. We'd like to talk about it. As a business paper editor, we see a good many of the "communications" that manufacturers direct to their customers, present and potential, through us or other means of distribution. Whether new product release, catalog, service or operational data, plugging of an applicational idea or promotion of the industry, they have definite value. Such communication helps build up our industry and we are all for it. Generally, *what* the manufacturer says is constructive. But there is often room for improvement in *how* to say it. To be effective, it must be read and absorbed. We recently received a booklet promoting an extremely important idea. If customers adopted it they could save a lot of money and the equipment wouldn't look bad, either. But we had to dig out the idea from an over-abundance of beautiful prose. The writer's English teacher would have given him an "A" for the job. But it missed. After a page or so, this reader's reaction was, "He's trying to tell me something." No sense of urgency was created or any incentive offered for a busy man to dig into it. Now, advertising people and good salesmen know that to sell a product you put your pitch in the customer's terms. You must know his problems, needs and what will motivate him. It's no different in selling an idea. This is a "hard-sell" year and the more that manufacturers know about their customers, the more effective will be their approach in communication—and sales. Some manufacturers have learned the trick of being on the customer's wave-length. Some haven't. To these we would suggest that they start working hard at it. It can be rewarding to them and establishment of better communications will benefit the industry too.

BPE

Why the executive engineer smiles

(he's looking through field and service reports on Sealed Power Chrome-Cyclan piston rings for diesel engines.)

DIESEL ENGINEERS must be conservative . . . critical in appraising any components of the engines they design. Components they specify must be tested far beyond the normal limits of endurance and performance before they place confidence in them.

Why engineers specify Sealed Power

They know they can rely on Sealed Power Chrome-Cyclan piston rings. At every step of manufacture these rings are put through stringent quality control tests...some by hand, most by precision machine. In all, there are 37 tests and inspections.

Chrome-Cyclan rings a plus for diesel engineers

Cyclan plus chrome in Sealed Power diesel piston rings positively defeats excessive heat, side-wear, breakage, friction and corrosion in applications where other rings fail. These unique rings break in fast—last, and last, and last.

Put Sealed Power leadership to work

Sealed Power is the world's most experienced manufacturer of sleeves and sleeve assemblies, too. They built and staffed a plant devoted exclusively to sleeve manufacturing. Sealed Power has more know-how, more experience in this highly specialized field.

Feel free to draw on this experience. It may help you with some diesel problem. Write or call. The engineers will be glad to discuss your problem or application with you.

Leading Manufacturer of Automotive and Industrial Piston Rings Since 1911

Sealed Power Corporation • Muskegon, Michigan • St. Johns, Michigan • Rochester, Indiana • Detroit Office • 7-236 General Motors Building • Phone Trinity 1-3440

Sealed Power Piston Rings

PISTONS • CYLINDER SLEEVES

Largest Producers of Sealing Rings for Automatic Transmissions and Power Steering Units

highlights

Interchange of motor vehicles among motor common carriers is closer. An agreement by 265 carriers on charges, rules and regulations governing this interchange has been filed for approval before the Interstate Commerce Commission.

Offshore oil drilling platform operates in 600 ft of water. This is six times deeper than depth worked by present rigs. New rig has diesel-electric power systems to raise itself on its tripod legs. Legs can be carried disassembled on deck and attached after rig arrives at site.

A portable water-cooling tower has been developed by the Badger Mfg. Co. and Engineer Research and Development Laboratories, Ft. Belvoir, Va. Although it's for use with the Army's mobile liquid CO_2 generating plants, it has many practical uses in industry. The unit permits reuse of about 90% of water consumed by the plant.

Nuclear energy and gas turbines will be combined in a development undertaken by General Dynamics Corp. A gas-cooled reactor will be the source of heat for a closed-cycle gas turbine. Success of the project depends on advancement of reactor and gas turbine development beyond known technology. It is estimated it will take 5 to 7 years to complete plant.

Increased productivity of modern equipment allowed highway construction costs to rise only 1.0% last year although cost of machinery rose 8%, steel and cement 6% and labor 4.5%. In giving these figures to Congress, M. C. Miller, representative of The Associated General Contractors of America, said that construction is the best buy public receives for its tax money.

Rise in heavy-duty truck registrations by mid-'58 is forecast by R. F. Black, chairman of White Motor Co. Units involved are over-the-highway trucks of over 19,500-lb gross weight. Factors cited as influencing this rise are: liberalized state laws on load limitations and lengths; modernized equipment hauling greater payloads, faster and more efficiently; and extensive highway construction and improvement.

Latest U. S. S. R. technical data will now be available in English. As one example, The American Society of Mechanical Engineers will publish the Russian bi-monthly "Journal of Applied Mathematics" translated into English.

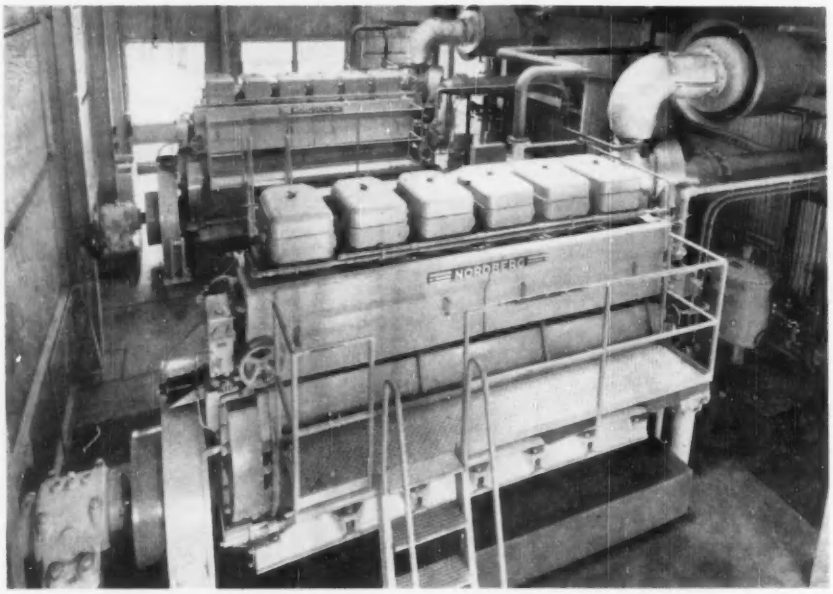
Catalytic ceramic coatings on piston heads can give greater combustion efficiency. Use of these materials, developed and under test at the Armour Research Foundation of Illinois Institute of Technology, reduces exhaust gas carbon monoxide and unburned hydrocarbons.

Rhodium-plating of commutator segments shows promise of reducing wear, current requirement, and elimination of radio interference. Selective plating process developed by Dalic Metachemical Ltd. permits plating without armature immersion. If you are having trouble, look into it.

A new type of spectrometer capable of chemical analysis of combustion gases in an operating engine could be a valuable tool for combustion studies. The Time-of-Flight Mass Spectrometer uses an ion gun to identify instantaneously vapored gases, liquids and solids by showing their molecular masses.

IH tells of design by electronic data processing machine in their HARVESTER WORLD. Solving an equation for figuring a cam profile involves some 7800 mathematical operations plus 1000 logical decisions — all taking about 100 hours with a desk calculator. Data processing machine time — 90 seconds! Engineers do the thinking; the machine does the routine calculations.

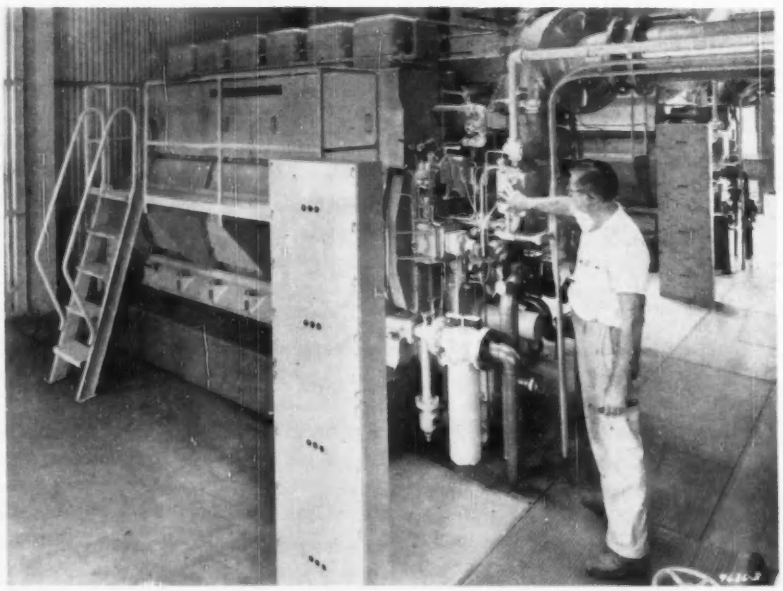
So. Cal. Gas Co. proved value of modern gas engines during revamping of Ducommun St. Station in downtown Los Angeles. Eight Ingersoll-Rand gas engine-compressors, Type KVS, 2000 hp, turbocharged, replaced nine horizontal steam engine compressors rated 2780 hp each and 22 boilers. Yet send-out pressure was boosted from 60 to 80 psi, capacity from 4-million cu ft to 5½-million cu ft. About a third less space was occupied.



Dual-fuel Nordberg engines drive pumps on other side of fire wall at left through flexible coupling and step-up gear. Engine room ventilator intakes surround exhaust pipes at right.

Centralized Control Improves Pipeline Operation

Modern equipment and instrumentation make possible automatic pipeline stations. Centralized remote control of these automatic stations makes individual station and overall pipeline operation more efficient.



Engines operate unattended after attendant starts them and centrifugal pumps are put "on stream". Control panel is at left of each engine. Turbocharger is at the upper right.

New buildings at Woodville, Texas, pumping station are of steel construction. Diesel fuel storage tank, exhaust silencers and intake air filters are located behind the station.

REMOTE control of engine-pumping units is the outstanding feature of two new pipeline stations. These were placed in service recently by The Texas Pipe Line Co. Four Nordberg engines operate unattended during the night in these stations on the East Texas main line system. A 12-in. line can pipe 73,000 barrels of crude petroleum per day 210 miles from Northeast Texas to Port Arthur.

The two stations are located near Diboll and Woodville, Texas. Woodville started up on September 5, 1956 and is the newest of the two. There are four other stations on this line. Above Woodville, two stations are electric powered and one is a dual-fuel station. There is one diesel station below Woodville.

The original Diboll station was destroyed by fire in 1955. Since another station was to be built in a general expansion and improvement program both Diboll and Woodville were equipped identically. Each has two 6-cyl, 4-cycle, 13-in. by 16½-in. bore and stroke turbocharged Nordberg Duafuel diesels.

Automatic Operation

For safety, pumping equipment is separated from the engines by a wall. If fire occurs, it can be confined to the space where it originates.

Except for starting, the four Nordbergs, each rated 960 hp at 460 rpm, are under complete push-button control from the master station at Douglass. However, although an attendant starts the units, preparation for the start is made by setting automatic controls on the board in the station office. The before-and-after lube oil and cooling water pumps are cycled into operation automatically. The time between preparation and start is also automatically controlled.

The attendant turns over the engine with starting air and starts it on diesel fuel. After idling for five minutes the engine is manually changed over to dual-fuel. Then it is placed under control of the automatic controller. This holds engine to speed needed for maintaining the line suction and discharge pressure limits set in the controller.

If jacket water temperature is too high or lube oil pressure too low, the engines are automatically shut down. Red lights light up on the control panel in the local and remote offices and an alarm sounds in each. If a man is present, he immediately checks the cause of the shutdown and corrects the trouble before starting the engines again.

Plus the protective devices on the engines, there is an alarm and automatic shutdown system connected to the line pumps and the step-up gear through which they're driven. Suction and discharge pressures are continuously recorded on the central control panel in the office. The controls are set for a maximum of 800 and a minimum of 30 psi line pressure.

Rate of pumping varies automatically with the rate at which oil is received into the station. The two units are connected to operate in series. Engine output is automatically controlled to meet pumping demands but it can be varied by the attendant. Performance in terms of pressure is automatically relayed by telemeter to Douglass.

Engines, gears and pumps are equally protected against trouble whether the attendant is present or absent. After following through the initial starting sequence and observing the engine on automatic control, the attendant leaves the unit to the control of the control equipment and the protection to the protection equipment.

Installation Features

The installation is simple. For each engine there is a closed system of jacket water cooled by heat exchangers in the crude oil line. A separate lube oil cooler is also cooled by oil in the crude oil line. This lube oil cooler is completely independent of the jacket water system and is not affected in any way by the jacket water cooling temperature. The purpose of separate flow to each cooler is to hold lube oil temperature below jacket water temperature. Both water and lube oil temperatures are automatically regulated by control valves.

Fresh makeup water in the closed cooling system and for other purposes is supplied by an automatic pump from a well. This water is treated to remove scale-forming impurities before it is added to the cooling system. How-

ever there's very little loss of water and makeup is infrequent.

There is a separate instrument panel in the engine room for each engine with cooling water, lube oil and starting air pressure gauges, oil and water temperature gauges and a pyrometer.

Lube oil is continuously pumped through a full-flow filter. A similar filter of smaller size is placed in the pilot fuel system ahead of the engine.

Since gas fuel supply is of commercial quality, no scrubber is needed.

Starting-air pressure is maintained automatically by an electric motor-driven, 2-stage, air-cooled compressor.

Conventional systems of air cleaning and exhaust silencing are used.

The step-up gear is connected to the crankshaft through a flexible coupling. The pump is driven by the high-speed pinion in a gear with a ratio of 460 to 3580 rpm. The centrifugal pump is rated 2760 gpm at 1082 psi at 3600 rpm. Pumps and gears are separately lubricated.

A scraper-detection unit in the main line lights a lamp and sounds an alarm at the local station if paraffin or other debris approaches. Since the detector is about 5000 ft up stream from the station, the attendant has time to stop his units; open the main line block valve; and close the suction valve when the alarm sounds.

Summary

Many engineering advances made in automation of pipeline pumping units have been incorporated in this installation. The advantages gained from these Nordberg engineering advances have made remote-control operation of these unattended pumping stations more efficient, economical, reliable and safer.

Major Equipment

Main engines	Nordberg Mfg. Co.
Step-up gears	Worthington Corp.
Main pumps	United Iron Works
Governors	Woodward Governor Co.
Fuel Injection System	Bendix Aviation Corp., Scintilla Div.
Air filters	American Air Filter Co. Inc.
Silencers	Maxim Silencer Co.
Temperature controls	Robertshaw-Fulton Controls, Co.
Jacket water coolers	Alco Products, Inc.
Lube oil coolers	Western Supply Co.
B&A water and oil pumps	DeLaval Steam Turbine Co.
Starting air compressor	Quincy Compressor Co.
Turbochargers	Elliott Company
Fuel filters	Commercial Filters Corp.
Pyrometers	Alnor, Illinois Testing Labs., Inc.
Pressure filters	Wm. W. Nugent & Co., Inc.
Gear oil coolers	Ross Heat Exchanger Div.
Gear oil filters	Cuno Engineering Corp.
Emergency generator set	Brance-Krachy Company
Telemeter system	Bristol Co.
Supervisory system	Control Corp.
Signal relay panels	Westinghouse Electric Corp.
Speed controls	Hagan Corporation
Pressure recorders	Mason-Neilan Div.—Worthington Corp.
Electric tachometers	Weston Electrical Instrument Corp.

Western RR's RDC's Top Million Miles With 100% Availability

WESTERN Pacific's two famed self-propelled "Zephyrettes" have topped the million-mile mark. The Budd-built RDC's (Rail Diesel Cars), have done this with records of practically 100% availability. The units, powered by Series "110" Detroit Diesel engines, traveled the Oakland-Salt Lake City, 924-mile route.

Of the total of two million miles, only one car failed once to complete a run by 11 miles due to a damaged compressor motor. The other has never failed.

The units were the first of the "Type 2" RDC's (combined passenger, baggage, express cars) to come from the Budd Red Lion Plant in Philadelphia in 1950. They're also the first of their kind to be placed in mainline, overnight service, a use not originally forseen by the builders. To do this, Western Pacific just provided lounge seats and extra lavatory facilities. Otherwise the modern, air-conditioned cars are the same as originally designed.

The two cars operate under extreme weather conditions with temperatures from minus 30°F to 110°F. In the Feather River Canyon the cars climb a 1% continuous grade for 104 miles.

Because Western Pacific workmen with supplies and equipment bound for various stations along the line outnumber revenue passengers, the service has operated at a loss for many years. However, in over seven years service, the RDC's have enabled the railroad to cut its annual losses by more than two-thirds. A loss of about $1 million in 1949 dropped to less than $300,000 last year, even with increases in costs of all kinds during the period.

About 356 RDC's are operating on 30 railroads in this country and abroad. Their versatility plus durability and low maintenance costs have resulted in replacement of hundreds of conventional passenger coaches and the freeing of expensive locomotives for other service.

Eaton Valves are Solving Problems Like These—

1. Broken valve due to overstressing.

2. Corrosion and cracking of the valve face caused by leakage.

3. Corrosion of the valve face due to sticking caused by stem and guide deposits.

4. Actual melting of valve material due to extremely high temperatures caused by preignition.

If you are having valve troubles, why not discuss them with Eaton Valve Division engineers. They will be glad to work with you in diagnosing the causes of failure, and in developing valves to meet the particular requirements of your engines and the kind of operation in which they are used. In hundreds of cases, Eaton engineers have been successful in suggesting measures which have corrected the most stubborn valve train problems. A study of your problem with complete technical report involves no obligation. Write, wire, or phone.

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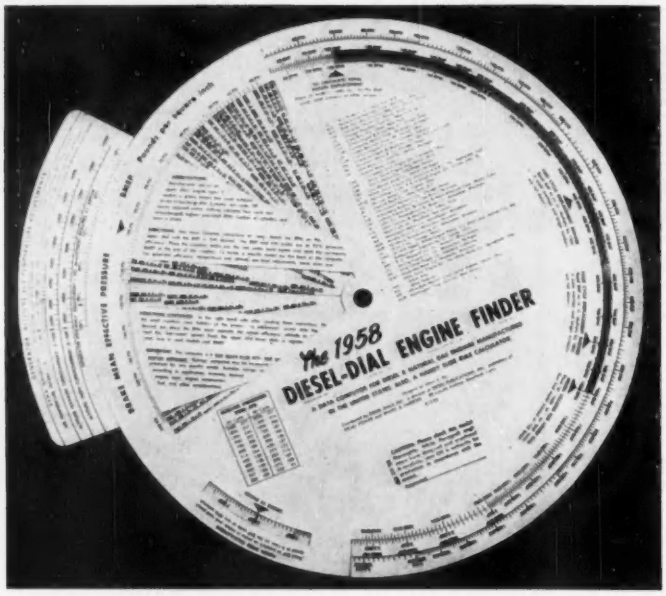


New Diesel-Dial Provides Engine Data

Looking for all engines to meet a certain specification? Got an application problem to solve? Facing a rating problem? Want to know bmep, piston speed of an engine at different ratings? The Diesel-Dial Engine Finder is a short cut to the answers to these and many similar problems.

YOU are an application or consulting engineer. You have certain specifications to meet—horsepower and speed requirements of driven equipment, limitations on piston speed, bmep or other characteristics. Perhaps compensation for generator efficiency, altitude or temperature is involved. Now, how do you find all the different makes and models of engines that may fit this job?

Or you're selling engines. You know which one of your own models is best suited for a certain job, but exactly what competitive engines may be offered? You know the other models that *might* be in the running, and in general how they compare with yours. On this specific job, however, it is fundamental to your sales strategy to know that engine "X" must be offered at or slightly beyond its top rating or that engine "Y" meets the specs only if it is excessively under-rated. Where do you get this information?

These are only two of a great many problems that must be solved daily. And not only by engineers and engine salesmen but by others in a wide range of job categories. How about the people preparing bids or writing specifications, factory people and their representatives, service engineers, in fact, anyone involved with engines, their ratings and characteristics.

All of these problems can be solved in time by conventional methods—*if you have access to the basic information and have plenty of patience.* The most concise source of general engine information is DIESEL POWER's annual tabulation of Diesel and Gas Engine Specifications. Now, a new and extremely ingenious device, called the Diesel-Dial Engine Finder*, adds a new dimension to use of the tabular material.

With the Diesel-Dial and the Specifications you have the distilled essence of a library of engine catalogs, plus the capability of solving a broad range of common rating and applicational problems. And the whole package won't even bulge your briefcase.

Using the Diesel-Dial

First, the Diesel-Dial resembles a circular sliderule. It consists of three sturdy plastic elements—the base disc, a movable arm and an upper rotating disc. All the necessary data for use—engine listings, scales, indices and instructions—are imprinted on these components.

Every engine make and model built in this country—diesel or natural gas engine, 2- or 4-cycle—is listed on the Diesel-Dial, Basic data on each engine includes bore and stroke, cycle, number of cylinders, and whether the engine is turbocharged or normally aspirated. Listings are in the order of increasing bore and stroke dimensions for quick reference.

In addition to this tabular information on the back of the dial there is a code number for each engine. The code number is used for quick and easy location of any particular engine on the front of the dial. There, all combinations of ratings and performance characteristics can be calculated for it.

Conversely, specific engine models can be located from horsepower, rpm and bmep data. A specific engine model may be found or all of the engines yielding those approxi-

Trade Mark Reg., Copyrighted, Patent Applied For.

mate characteristics can be located. For example, assume a specification for an alternator installation in which the horsepower requirement and particular synchronous speed are specified. Setting horsepower and speed, the arm can be moved through the acceptable bmep range and all the engines that might do the job can be picked off the Dial.

When examining a specific model, effects of any speed, bhp, kw and bmep combination are quickly seen. For example, assume that specifications limit allowable bmep for a turbocharged engine to 130 psi and rpm to 900. A glance at the calculator set for a particular model gives the horsepower that this engine would develop. Where greater flexibility of specifications is permitted, several settings can be made to determine an optimum rating for the engine.

Piston speed limitations crop up in many specifications. Piston speed can be found quickly for any engine or any empirical stroke-rpm combination. One index is set at the stroke in inches and piston speed is read opposite any rpm selected. Displacements of different engines are similarly determined by use of appropriate indices.

When generators are involved, the scales show the correlation between kilowatts and horsepower. Corrections for generator efficiency can also be set in to give the required horsepower.

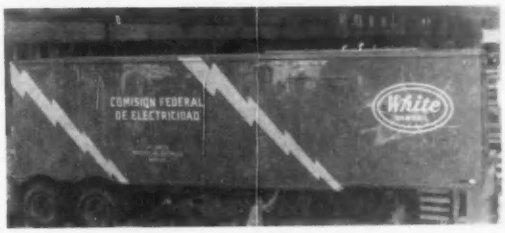
In the same way, horsepower corrections for nonstandard conditions can be made. Separate scales correct for altitude variations for both normally-aspirated and turbocharged operation. Also, intake air temperature corrections can be made in accordance with DEMA practice or other selected criteria.

In Summary

Edwin E. Bly, designer of the Diesel-Dial Engine Finder, has managed to pack all these capabilities into a 10½-in. circular calculator. In fact, there was still room for convenient conversion tables. Accuracy is about that of a 10-in. sliderule or roughly three significant figures. And speaking of sliderules, the horsepower and rpm scales, being logarithmic, can be used in the same manner as the "C" and "D" scales of the regular sliderule.

All in all, the Diesel-Dial is a practical, time-saving tool for anyone involved with engines and their rating considerations. It is simple to use, requiring only a very short familiarization period. It is a fast method of graphical solution to many different problems, permits rapid comparisons of different engines and shows the effects on performance of many variables. The latter should be of particular importance to practical-minded educators who frequently want to demonstrate these effects to students.

The Diesel-Dial's natural complement is DIESEL POWER's Diesel and Gas Engine Specifications, the latest edition of which will appear in our April issue. Both are available through DIESEL POWER. Together, they take the place of bulky catalogs while providing all essential information. Plus this, the Diesel-Dial is a safe, reliable short-cut to information normally developed only through lengthy and tedious calculations.



Mobile Units For Power-Hungry Mexico

BOOMING Mexican economy demands mobile power. Five 500-kw, completely self-contained, diesel generator sets recently delivered to Mexico will go a long way in satisfying this need. The 755-hp, turbocharged, 4-cycle Superior diesel-driven generator sets were furnished by the White Diesel Engine Div. of The White Motor Co., to Mexico's Comision Federal De Electricidad.

Each unit is capable of supplying the normal power needs of a town of 2500 people. The units will be used to power new areas, help in rerouting existing power lines and to meet peaks in power needs across Mexico. This is in keeping with the Mexican Power Industry's plan to provide adequate power for their mushrooming industry and commerce and bring the benefits of modern civilization to rural areas.

Since the units can operate on lower-quality diesel fuels, even these remote areas are assured of a fuel source. The engines can also be arranged for dual-fuel operation. They can operate on 100% oil, or natural gas with pilot fuel injection for ignition if semi-permanent location is desirable.

The units built into trailers 32-ft long, 8-ft wide and 12½-ft high, are hauled wherever needed by White or Autocar tractors. The trailers are especially strengthened in chassis and sides for long service. The 8-cyl, Model 40, Superior Diesels, operating at 900 rpm can pull continuous load at elevations above 8200-ft. A 280-gal tank in the trailer's belly holds enough fuel to run each unit at capacity for 12 hours.

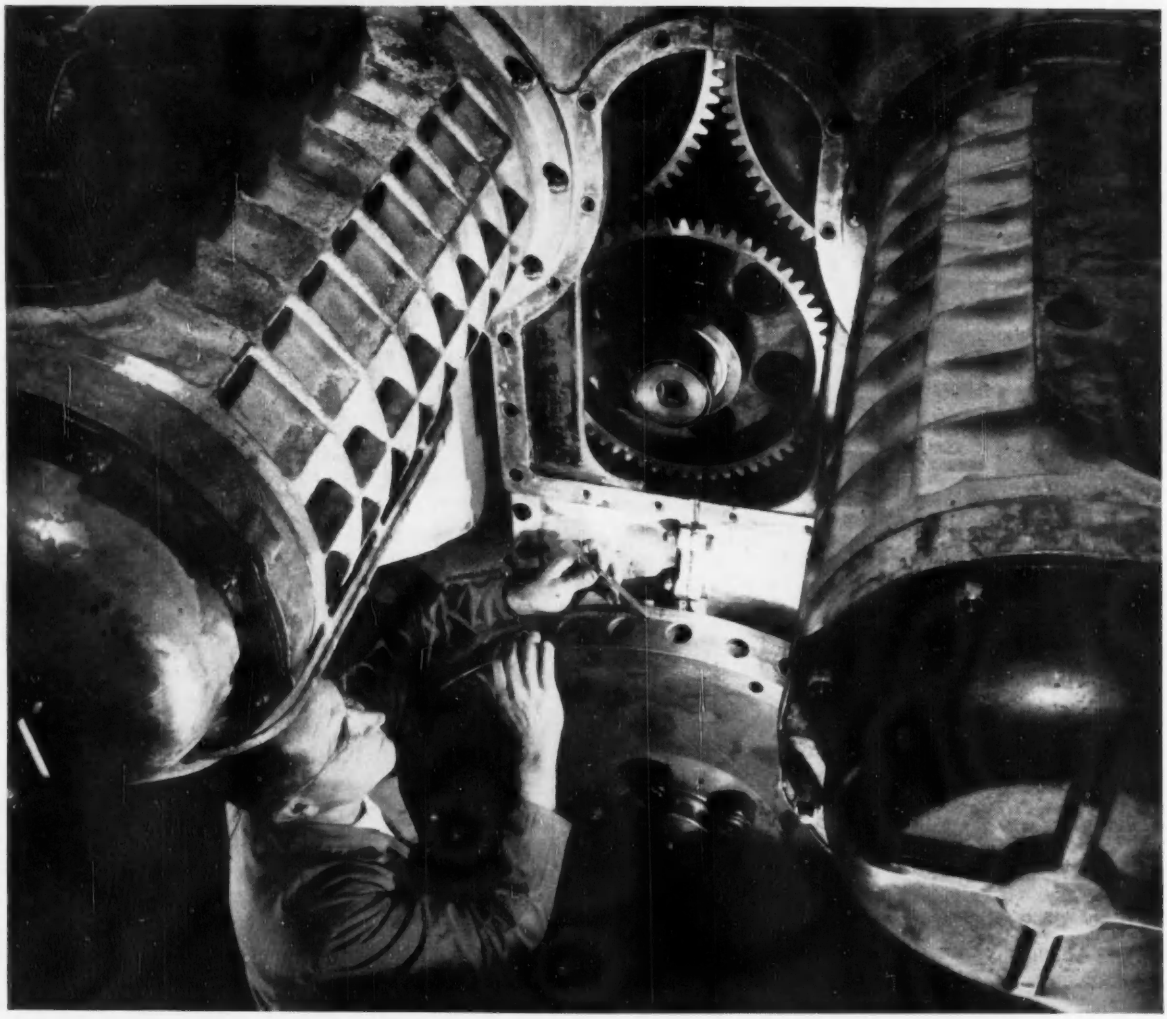
All essential parts of the units are standard production items and as such, can be mass-produced. A standard version of the Autocar truck can be used to haul the trailer.

All units are completely self-sufficient once their diesel fuel tanks are filled. One man can operate each unit by means of a single electrical distribution control panel.

ENGINEER'S FIELD REPORT

PRODUCT RPM DELO OIL RR

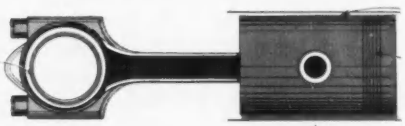
FIRM NORTHERN PACIFIC RAILWAY
South Tacoma, Wash.



RR diesel gears show only ½° wear in 2½ million miles

Timing gears on this Northern Pacific GMC-diesel locomotive engine, lubricated with RPM DELO Oil RR, recently completed 2½ million miles of severe freight service without repairs or adjustment. NP's South Tacoma Shop Foreman, A. R. Genin (above), indicates degree marks on engine flywheel, used to gauge gear wear. Tolerance between gear teeth shows variance of just ½° from original setting. Mr. Genin says, "We consider this low rate of wear remarkable for heavy-duty freight operation. It is typical of our experience during the 12 years we have used RPM DELO Oil in all our locomotive diesels." Engines are 1350 h.p. 16-567 series.

Why RPM DELO Oil RR reduces wear, corrosion



• Oil stays on engine parts—hot or cold, running or idle • Anti-oxidant resists lacquer formation • Detergent keeps parts clean • Special compounds prevent corrosion of bearing metals • Inhibitor resists foaming.

For More Information about RPM DELO Oils or other petroleum products of any kind, or the name and address of your nearest distributor, write or call any of the companies listed below.

LUBRICATING OILS RPM DELO

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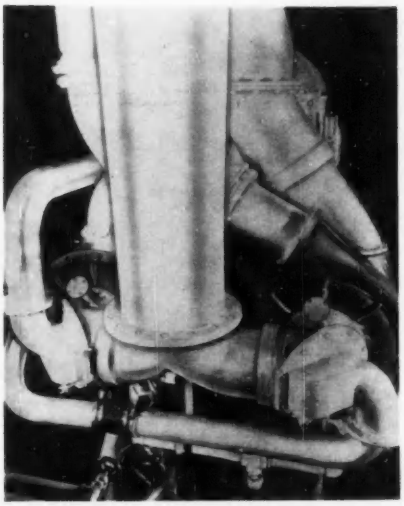
STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20

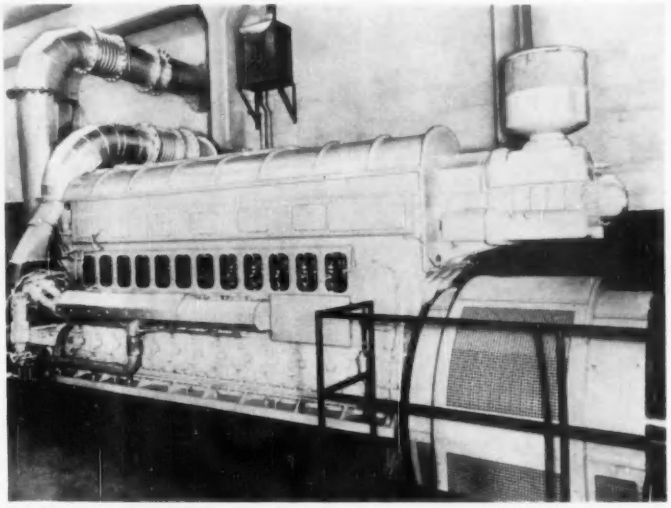
THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey

STANDARD OIL COMPANY OF TEXAS, El Paso

THE CALIFORNIA COMPANY, Denver 1, Colorado



Exhaust gases drive these two turbochargers used on engine in adjacent photo. They permit engine operation without assistance from the scavenging air blower from about one-third load to overload.



F-M 12-cyl, O-P diesel rating was increased 50% by turbocharging. It has easily carried 10% overload in field operation and during extensive testing. Basic engine weight is 12.8 lb per horsepower. One of the two turbochargers used is visible at end of engine.

Turbocharging The O-P Engine

Here's how Fairbanks-Morse turbocharged their opposed-piston engine and what was gained.

THROUGH turbocharging, Fairbanks-Morse has boosted its 2-cycle opposed-piston engine's output by 50%. Space requirement and weight per horsepower have been cut substantially. Specific fuel consumption has also been cut. These are important applicational and economic advantages.

Turbocharging is now applied to the 6- and 12-cyl. 8⅛-in. by 10-in. opposed-piston engines. They weigh about 24,900 lb and 46,200 lb, or just 2000 lb and 4000 lb more, respectively, than their non-turbocharged counterparts.

Ratings of up to 300 hp per cylinder at 900 rpm are permissible. Thus, at its top continuous rating the 12-cyl unit develops 3600 hp at 900 rpm. This corresponds to 12.8 lb per hp. However, recommended speeds will vary with application. Most stationary power plant installations will run at 720 to 750 rpm, marine and locomotive applications at 850 rpm and standby units at the top rating of 900 rpm.

Even at top ratings, the engines have good reserve capacity. For example, a 12-cyl unit under test in an industrial plant has been carrying overloads of up to 10% (3870 hp at 900 rpm) with ease and efficiency.

Space needed for installing the turbocharged engine is about the same as for the conventionally-scavenged unit. Turbochargers are mounted on the end of the engine and extend little beyond normal piping connections. Therefore, up to 50% power increase is available with negligible increases in space and weight. In just about every application this can be converted to actual dollar benefits. Plus this there is the improvement in specific fuel consumption.

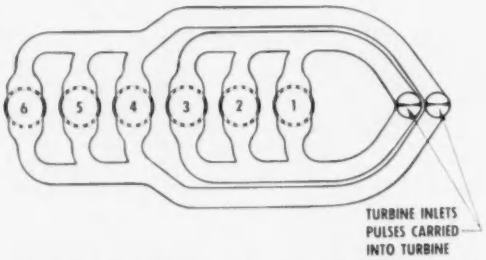
One other advantage is inherent in turbocharged engines. Greater percentage of sea level power is available at the higher altitudes.

Turbocharged Operation

The system of turbocharging used is the so-called "pulse" or "blow-down" type. At the moment that a cylinder's exhaust ports open, a pulse is created by the blow-down energy. Exhaust gases are flowing through the turbocharger turbine and in the process of expanding are imparting some energy to turn it. The pulse energy must also exist through the turbine wheel and thus creates an additional and powerful driving force.

In such systems, the exhaust manifolds are divided to prevent these pulses from entering other cylinders through open exhaust ports and interfering with their normal scavenging process. In this case there is a separate manifold for each three cylinders. Each cylinder, due to the arrangement and firing order gets equal time for exhaust port opening and no overlapping can take place.

Effect of the pulse is of greatest importance during



Pulse system exhaust manifold of a F-M 6-cyl, O-P diesel having a firing order of 1-6-2-4-3-5. Cylinders 1, 2, and 3 exhaust into one manifold, cylinders 4, 5, and 6 into another.

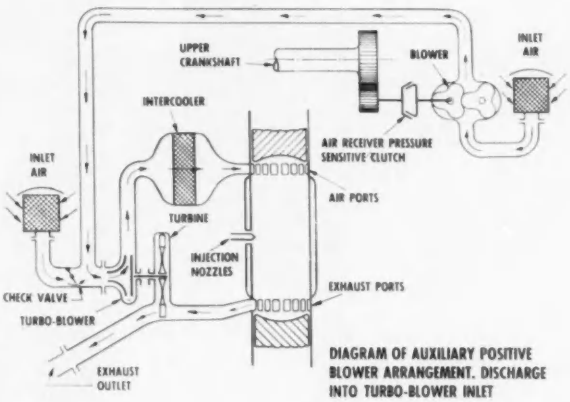


DIAGRAM OF AUXILIARY POSITIVE BLOWER ARRANGEMENT. DISCHARGE INTO TURBO-BLOWER INLET

Arrows show exhaust gas and scavenging air flow in a F-M turbocharged O-P diesel engine system. Air receiver pressure-sensitive clutch disengages mechanically-driven blower when scavenging air pressure from turbochargers exceeds discharge pressure. This happens at about 40% load.

part-load operation when exhaust energy normally diminishes. By using the exhaust pulse, which consists of an intermittent pressure rise, the energy is more effectively supplied for driving the turbine.

By means of the turbocharger blower, air is compressed to the required air receiver pressure. Scavenging air is cooled on its way from the turbocharger blower to the air receiver. This makes available a more dense air charge for each combustion cycle.

From about one-third load up to overload, exhaust energy to the turbine is enough to supply adequate scavenging air. Below one-third load, it is necessary to supplement the air supply with an engine-driven positive-displacement blower. Arrangement of the entire system is shown.

After the engine is started and up to about 40% load, the supplementary blower supplies scavenging air to the engine. Above the 40% point it is disengaged automatically by means of a heavy-duty, tool-machine type clutch. It remains at standstill at all higher loads and is only re-engaged if the engine drops below about 30% load.

Clutch operation is controlled by air receiver pressure. During starting when air receiver pressure is nil, the clutch is engaged positively and a good supply of combustion air is available from the blower.

This blower discharges into the suction of the turbocharger blower. A check valve in the piping prevents loss of this air to the atmosphere. This check valve opens automatically when turbocharger blower begins pumping more air than is supplied by the auxiliary blower. All air passes through air cooler located on engine above air receiver.

Other Design And Operational Features

General design features of the supercharged and the non-supercharged opposed-piston engines are essentially the same. By packing a heavy charge of cool air into the cylinders, F-M engineers have raised bmep 50% to 129 psi. This permits the rating up to 300 hp per cylinder without excessive thermal loading. Additionally, firing pressure has been held to a conservative 1350 psi.

These factors combine to permit a wide interchange of parts between the supercharged and non-supercharged engine. Basically, only cylinders, pistons, engine-driven blower and exhaust system differ in the two types. Cylinder block, connecting rods, crankshafts, pumps, gears, camshafts and bearings are interchangeable.

At the 50% higher output, lube oil and water cooling requirements show almost no increase. An example is seen in the case of the industrial test engine mentioned earlier. Originally, this engine was rated 1920 hp at 720 rpm. Although now operating at 3600 hp at 900 rpm and at sustained overloads, the original cooling system is used and is adequate.

Since more heat energy is converted to power, fuel consumption is from 5% to 10% lower at full-load turbocharged operation. It is even much lower at part-load operation. There is uniformly low fuel consumption from 50% load to overload.

Summary

F-M has achieved several important advantages by turbocharging their OP engine. Power increases of up to 50% with practically no increase in space and weight requirements add up to real economies and opportunity for broader application.

Better utilization of fuel energy, increased mechanical efficiency and reduction in parasitic engine loads (by substantial elimination of mechanical blower operation) have combined to improve specific fuel consumption. Effective use of exhaust pulse energy permits self-sustained turbocharged operation above one-third load and even below this point the mechanical blower performs only an auxiliary function. Plus this, it is only half normal size and absorbs only little engine horsepower when operating.

The testing program has involved over 20,000 engine hours including several 500-hr endurance tests. F-M engineers have proven that all engine components can not only meet the newly imposed stresses but have ample reserve.

Temperature and pressure set points are inside the case, protected against accidental manipulation. Cover is removed for easy adjustment.

New Diesel engine safety switch

...gives fail-safe protection

This all-new Honeywell safety switch responds to abnormal pressure or temperature to stop or idle a diesel engine, or actuate an alarm circuit.

It combines separate systems for measuring engine coolant temperature and lubricating oil pressure. The temperature system includes an exclusive fail-safe feature, so that in case of damage to its temperature bulb, capillary or diaphragm, the switch responds as it would to excessive temperature.

Temperature and pressure settings can't drift off set points. There can be no false shutdowns due to vibration. Set points are easily adjustable in the field.

Your nearby Honeywell sales engineer will be glad to give you complete information about the new Diesel Engine Safety Switch. Call him today . . . he's near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pennsylvania.

● **REFERENCE DATA: Write for Specification sheet S1010-5 "Diesel Engine Safety Switch."**

MINNEAPOLIS **Honeywell**
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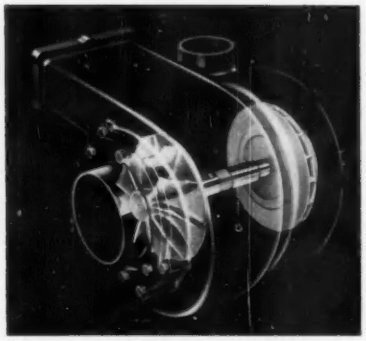
First in Controls

Talking Shops



A turbocharger rebuild station, one of six recently set up throughout the country by the Cummins Engine Company, is the subject of this interview. The shop is located at the sales and services facilities of Cummins Diesel Engines, Inc. in Philadelphia, Pa. Plan of operation, tooling, procedures used and a discussion of turbocharger troubles and their prevention are covered in detail in this article.

CUMMINS Engine Company has decentralized turbocharger repairs. They realized that with turbocharger usage growing daily, service availability for this component had to be equal to that for the rest of the engine. Customers could not be expected to hold still for long and costly periods of downtime while turbochargers were returned to the factory for repairs. Now, fast replacement service is available through all Cummins sales and service facilities.

This was explained by Ralph W. DeLuca, branch manager of Cummins Diesel Engines, Inc. in Philadelphia. Here's how the rest of the interview went.

"Ralph, how can six rebuilding shops give good national service?"

"Consider it this way. We don't work for the customer directly; we work for all the Cummins distributors in the area assigned to us. We get turbochargers in from Ohio to Maine."

"And the customer waits?"

"No. He gets a replacement unit immediately for a flat exchange price. Cummins service shops will have a stock of rebuilt turbo's in their parts departments for immediate exchange.

"Faulty units will be sent to us for rebuilding. It doesn't take long; we usually get them out of here within two days of receipt. Sometimes it will be the same day and if work load is heavy, three days at the most."

"What makes do you rebuild?"

"Only Cummins. The Model T-506 for J Series engines and the Model T-590 for NH Series engines."

"What principal troubles do you find?"

"I'll let you talk to Frank Janowiak," our service manager, about that. I might say that we have had some normal growing pains as with any new product but with present production units, we've had very little trouble."

"Thanks, Ralph. Now, Frank, what are your principal repairs?"

"First of all, don't say repairs. We figure that when we get a turbocharger, it's ready for rebuilding. It gets a complete rebuild here and at the same time, all the latest modifications are incorporated.

"As for troubles, most of them are bad bearings, warpage or damage to the turbine and nozzle ring. The sad part is that most of them could be prevented.

"Records show that over a third are repeat failures—that is, more than one turbocharger has failed on the same engine. We've seen as high as four or five fail. That pins it down to one of two things—faulty installation or improper operation, including maintenance."

"Let's talk about installation faults."

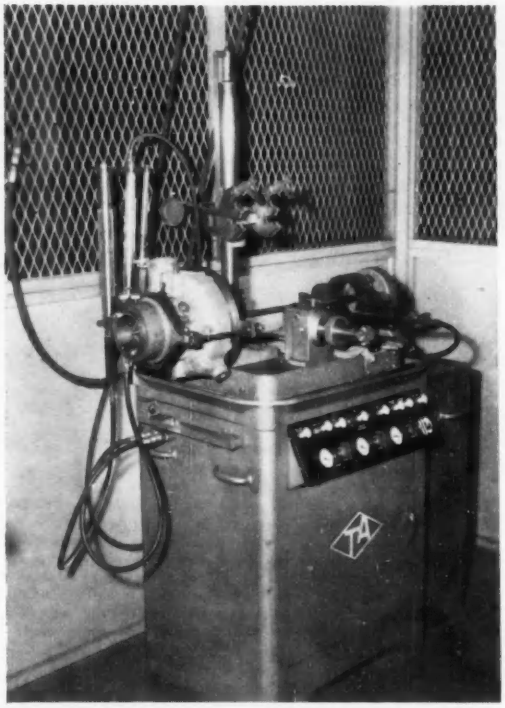
"Well, the first principle in installation is that no strains should be put on the turbocharger. Yet we find cases where it is carrying the weight of exhaust piping or where water or oil piping is putting a strain on the unit. Then there is the support bracket. This must be the right length (shimmed if necessary) so that there will be no distortion when it is attached.

"These turbo's get hot and must have room to expand and contract. They must be firmly mounted and every precaution taken to insure that they are not subjected to strains or vibration.

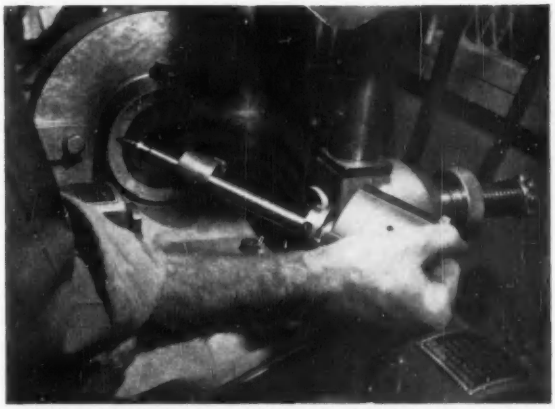
"Next point concerns the intake and exhaust systems. First, they should be absolutely tight—no leaks. If there are any, the turbocharger won't come up to speed and you get high exhaust temperatures and smoky exhausts.

"You can get the same result if the intake is restricted by dirty air cleaners, too small an air cleaner (remember, more air goes through the engine when turbocharged), small piping and anything else that causes restriction.

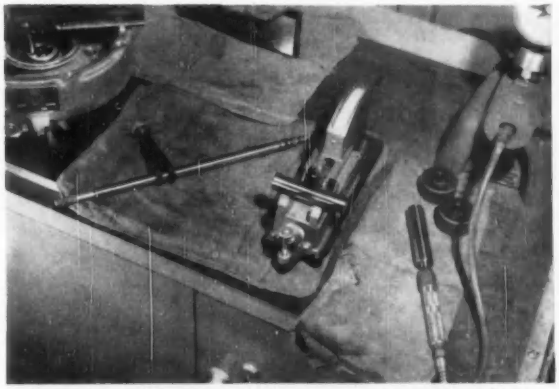
"On the exhaust side, restriction should be as low as possible. Piping that's too small, a lot of sharp bends,



Tobin-Arp pin fitting machine was adapted for boring and facing turbocharger bearings. Main casing is mounted on special knee-type fixture and held by clamp. Special chucks in casing bore and in fixture support boring and facing tools. Horizontal quill shaft seen drives cutting tools. Machine, built for precision fitting of piston pins (in tenths of a thousandth) and similar operations, is well suited for this particular boring and facing operation.

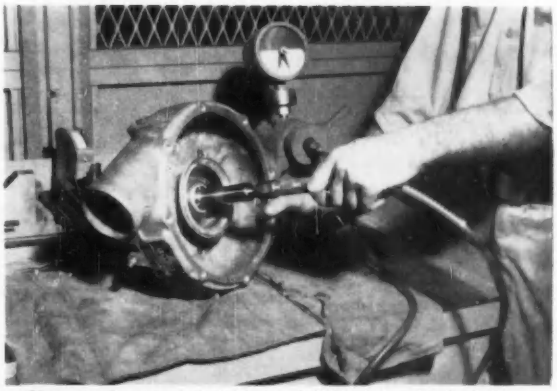


Tool used for facing has carbide cutting bits. Left cutter slides off shaft to permit insertion through bearing bore. Design of supports and tool is such that finished faces are properly located along axis of bore and that face-to-face distance is accurate.

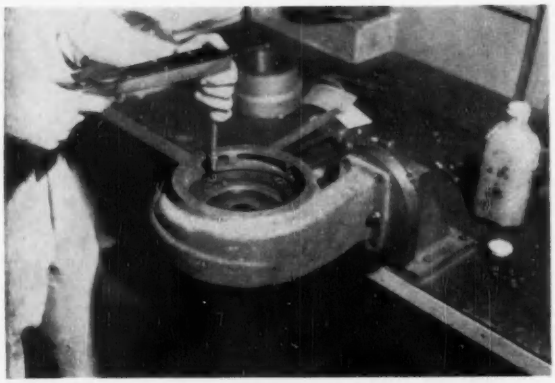


Boring tool settings are made by the comparison method. Comparator from pin fitting machine is in center with Cummins bearing bore gauge in vee-block. Zero setting is made from gauge. Boring bar with two carbide-tipped bits (setting clamp straddling one) is then placed in vee-block and tool setting made to zero plus 0.0004-in. At upper left, face-to-face distance is checked. Casing is fitted over mandrel with lower bearing thrust face resting on mandrel shoulder. Length above shoulder is exact face-to-face distance. Bridge gauge, set to zero on fixture at rear, then checks face-to-face distance and also parallelness of the bearing face and the casing flange.

Operator listens for end of cut on boring operations. Single cut is made. Feed is automatic but stopping is manual. Pneumatically-expanded mandrels in background are used for accurate location of pistons, connecting rods, rocker arms, etc., during other precision boring operations performed on machine.

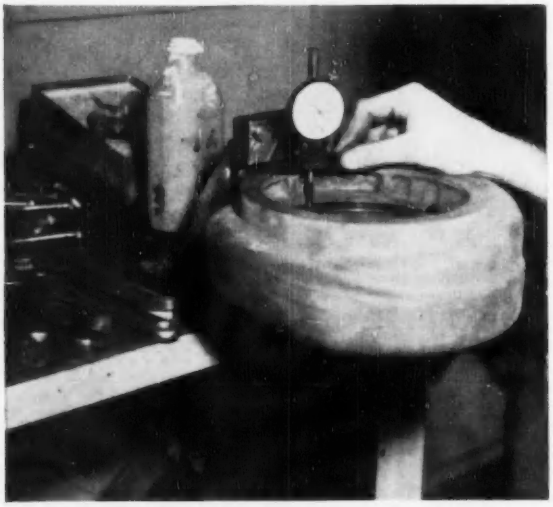


Size, roundness and straightness of finished bore is checked on a Pratt & Whitney Air-O-Limit air gauge. Tolerance is a few tenths of a thousandth. Once okayed, casing is ready for re-steaming to remove all chips. For your idea department, a stick-type lubricant, commonly used on car doors, is applied to bearing lube holes before boring to prevent chip entry into oil passages. Reverse steaming flushes lubricant and chips out of bearing bore.



Jig holding the turbine casing turns 360 deg in 90-deg steps. Here, the nozzle ring is being torqued in place. Previously, machined surface of recess and flange were cleaned and checked for acceptable parallelness using a bridge gauge. Here's another idea. Common milk of magnesia is applied to all threads at the hot end. It keeps them from freezing in place.

With main casing assembled to turbine casing, oil is applied to bearings and the rotor installed. Exhaust casing is attached and retains turbine wheel. During buildup process, inner and outer heat shields, oil seals, diffuser, etc., are all appropriately installed. Here, thrust collar and compressor wheel are being aligned. Rotor assemblies are dynamically balanced at factory and punch marks are made to show position of removable parts including the nut. With collar and wheel aligned, wheel is pressed on shaft. Nut is used to seat the wheel and its match mark should also be aligned.



Depth of nozzle ring face below flange is checked around circumference to make sure it is not warped. Exhaust outlet casing is similarly checked before installation. All these checks insure that upon complete assembly, turbine wheel will have proper clearance at all points.

With turbocharger assembly complete, final check is made of rotor end play. If shaft spins freely and end play is correct, the turbocharger rebuild is considered complete. All openings are masked and the unit is ready for delivery.

A complete stock of parts for the T-506's and T-590's is available to the rebuilder. Parts may be new or factory-reclaimed as in the case of the 0.005-in. under rotor assemblies. Smaller parts—bearings, gaskets, shims, common hardware, etc.—are stored in a separate cabinet which is not shown.

a high back-pressure muffler or one that's damaged will cause the turbo to run at abnormal temperatures. It also increases engine back-pressure, making valves and other parts run hotter."

"What about the lube and water piping?"

"One thing to remember about lube oil supply is that you must both get it in and out. The piping must be big enough to supply enough filtered oil at the right pressure. The drain is important too. It should be tapped into the turbo housing where all the oil can drain by gravity back to the engine sump. A short, direct line with an ID at least twice as big as the supply line should be used.

"The same principles apply to the water lines. Free circulation is required to keep temperatures within limits. If these details aren't observed, you'll get bearing failures and probably damage the rotor assembly."

"Now, how about operation and maintenance?"

"In operation, overfueling and hot shutdown are two big offenders. If you overfuel for a particular operating condition the turbocharger will overspeed and get too hot. You can ruin the unit right then and there.

"Hot shutdown is bad for any engine and is particularly rough on the turbocharger. After a heavy-load run, the engine should be idled for at least two or three minutes. This keeps both oil and water circulating while little heat is being added to the engine and turbocharger parts. They get a chance to cool off gradually. This avoids high heat stresses that lead to distortion and eventual bearing failures or other troubles.

"As for maintenance, the effects of low water or lube oil are pretty obvious. If the cooling system is in bad shape, the turbocharger won't cool properly. Let your oil get too dirty, and your turbo's bearings have had it. Dirty air cleaners and an exhaust line or muffler that isn't checked will cause the troubles we discussed earlier."

"If operators would watch these things, not only the turbochargers but the engines would last longer. Sometimes, it's just a shame."

"Any other items you can think of?"

"Just one. You can't use exhaust brakes with standard turbochargers. The use of exhaust brakes require piston-ring type seals in the turbo. These turbos are furnished as Assembly Nos. T-506-P and T-590-P."

"You mentioned modifications during rebuilding. What's involved?"

"Some early units had babbitt bearings. We replace these with new-type copper-lead ones.

"To get more air delivery at the lower speeds, some diffuser plates have been changed in the compressor end. At the same time, some nozzle rings were changed to effect a higher rotor speed. Parts with the new designs are always installed in rebuilt T-506 turbos. They're also used in T-590's on high output engines."

"Now let's see some actual rebuilding."

"Okay, Charlie Van Rensselaer who heads up our turbocharger rebuilding department will take you right through a job. He'll give you all the data you need."

"Thanks, Frank. Now, Charlie, what's the first step?"

"Disassembly and inspection. We have a separate form for the T-506 units and the T-590's. All data concerning the unit is entered. Every part is listed and its condition must be noted. We also enter the new parts used. It's a good history and can be used for analysis of troubles and determining parts requirements."

"Do you reclaim any parts?"

"No, they either meet rebuild specifications or we use new parts. Some parts are returned to the factory for possible reclamation. A lot are saved. Our only non-standard work concerns bearings. We get reclaimed rotor assemblies with shafts that are 0.005-in. under. Thrust shoulders are also refaced, changing the distance between them.

"In reclaiming we use standard size bearings and bore to the right size. To allow for the difference in thrust face distance, we use a 0.010-in. shim under the thrust face of a bearing when we press it in. Proper end clearance is obtained when we face the bearings."

"What about cleaning?"

"Although all parts are cleaned, the main casing with its water and lube oil passages get the greatest workout. It goes into the soak tank for about two hours and then is completely steamed out. Incidently, while it's still hot we usually press in the new bearings."

"Do all turbochargers get new bearings?"

"Not all, but the majority do. We check side clearance and end play with a dial indicator. If they are within the rebuild tolerances we leave them alone. Don't forget, though, that just about everything that causes a turbocharger to fail sooner or later shows up in the bearings.

"That's why most of our precision tooling and gauges center around getting the bearings right. Here's the main casing of a turbocharger for rebuilding. New bearings have been installed. I'll show you what we do."

(Procedures are illustrated and explained in the captions)

"That didn't take long. What's the average time?"

"Generally, 3 hours or a little less. The amount of work varies and some are tougher than others."

"Now, what about testing?"

"If the rotor spins freely and the end play is right, that's it. Procedures have all been worked out at the factory and correlated with running tests. Periodically, rebuilt units are pulled from stock and sent to the factory for complete testing.

"Results are the final answer. So far, we haven't had one rejected at the factory and—knock wood—none have come back from the field."

NEW ENGINE SPECIFICATIONS

Seventy pounds of diesel and natural gas engine catalogs and specification sheets have been referenced, digested and the pertinent information placed on a special computor.

Designed by Edwin E. Bly and produced by Diesel Dials, Inc., 80 Lincoln Avenue, Stamford, Conn., this new time saving instrument gives rating and application characteristics of all diesel and natural gas engines manufactured in the United States.

BRAKE MEAN EFFECTIVE PRESSURE
BMEP Pounds per square inch
The 1958
DIESEL-DIAL ENGINE FINDER
A DATA COMPUTOR FOR DIESEL & NATURAL GAS ENGINES MANUFACTURED IN THE UNITED STATES. ALSO, A HANDY SLIDE RULE CALCULATOR.
Designed by Edwin E. Bly
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CAUTION: Please check this model thoroughly. While Perrygrad engineers have designed and proofread it carefully, your OK is authority for production in accordance with the model.
Approved_____
TO CALCULATE TOTAL PISTON DISPLACEMENT
GENERATOR ALTITUDE and TEMPERATURE ADJUSTMENTS

SLIDE RULE

FOR DIESEL & NATURAL GAS ENGINE INDUSTRY

In seconds, it will solve complicated engine computation and application problems and provide for corrections in altitude, temperature and generator efficiencies. A few settings will give you all engines by make and model that can be considered for any specific application under any specification. And just as important, you will know the required BMEP and RPM of each individual model for that particular situation.

Where only partial information is available in an engine rating, the dial will solve for the missing element.

A stickler among all engines is the question of ratings — the dial indicates all combinations of BHP, BMEP and RPM for every engine listed. Solutions are graphic and can be read directly. No special skills are required other than a cursory knowledge of diesel engines.

The dial has been manufactured for all segments of the industry for . . .

Salesmen — the Diesel Dial will more than pay for itself the very **first** time you see exactly how your engine will fit among the others before the purchaser decides . . . and know it right down to the exact BMEP.

Consultants — will save hours of calculations needed to write your specifications to best meet the rating requirements of your client. The Diesel Dial does it in a few moments.

Prospective Buyers — with a copy of the Diesel Power Engine Specifications and a simple setting or two on the Diesel Dial you have all engines that will fit into your power requirements. And not only can you read directly the manufacturers and the exact models, but you will also know the required RPM and BMEP needed of each and every model to meet your requirements.

Suppliers of Diesel Auxiliary Equipment — now have the answer to hunting through endless catalogues and diesel engine manufacturers' specification sheets. This reference instrument will give you horsepower information as well as exactly which engine manufacturers might be involved in any need that comes to your attention.

Students and Teachers — seldom is a practical instrument used by engineers in the field useful for teaching basic principles. However, the Diesel Dial simply and concisely presents in a way not otherwise possible, the visual relationship of BMEP, RPM, BHP, KW, piston speed and displacement and the effects of altitude, temperature and changes in generator efficiency. Further, it shows these for each and every engine.

Market Analysts — besides the several arrays of engines shown on the dial, any and all arrays pertaining to engine capabilities can be quickly constructed. Not only can you rapidly see how your particular engines fit into the market, but you can spot product gaps in the industry as a whole.

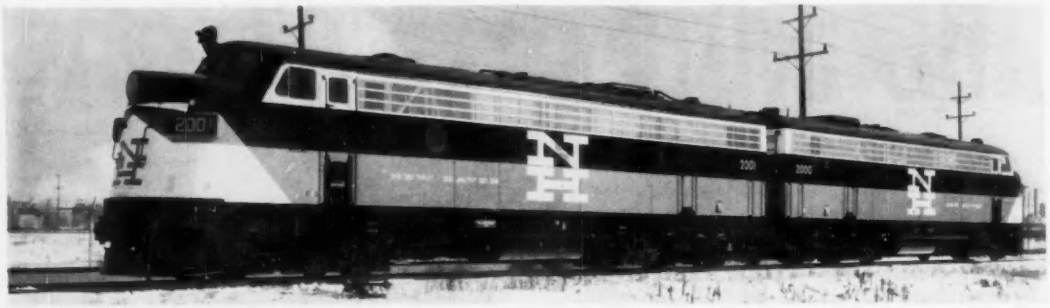
Packaged in a convenient carrying case on which are printed the complete operating instructions, this 10" diameter instrument fits conveniently in a brief case. Constructed similarly to a circular slide rule, it is of sturdy and durable plastic resistant to moisture and humidity. As an added advantage the logarithmic scales are arranged for solving any multiplication or division problem.

To order your Diesel Dial simply send your check or money order to Diesel Dials, Inc., 80 Lincoln Avenue, Stamford, Conn. Delivery will be made in 3 weeks. If you are not completely satisfied, your money will be cheerfully refunded. Satisfaction is guaranteed.

DIESEL DIALS, Inc.

80 Lincoln Avenue

Stamford, Conn.



EMD Standardizes Dual-Purpose Locomotive

Cost of operating both diesel-electric locomotives and third-rail powered locomotives is eliminated by EMD's 2-in-1 units.

A FULL-RANGE, dual-purpose diesel and third-rail electric locomotive has been added to its standard line by EMD. The new units made by the Electro-Motive Div. of G.M. are now available to any U. S. railroad with territory divided between diesel and electric operation. They eliminate the costly need of operating two kinds of locomotives.

The new 2-in-1, 89-mph, locomotives can enter and leave third-rail territory hauling conventional passenger or freight trains without even slowing down to change from diesel to third-rail power or vice versa. They were originally designed to meet the special needs of the New Haven RR. Thirty of them have already been delivered to the New Haven. They are operating as 15, 3500-hp, 2-unit locomotives between New York and Boston.

The 2-in-1, Model FL-9 locomotive is just 4-ft longer than a standard EMD FP-9 diesel passenger locomotive. Each FL-9 unit has a 1750-hp, 16-cyl Model 567C diesel and four Model D47 traction motors. Traction motors can draw power directly from the third rail when the diesels are shut down. This ability to use third-rail power is based on a modification of dynamic braking resistors plus newly-developed automatic controls.

The engineer remains in the cab to control transition from diesel to electric operation and vice versa. When he is about to leave a third-rail area, he starts the diesels from the control stand in his cab. With a set of simple controls he cuts off the third rail and begins drawing power from the diesels. When clear of the third rail, he operates the control which folds up the shoes and the train rolls on as a normal diesel. All this can be done without reducing train speed.

To put third-rail pickup shoes on the FL-9, a new EMD-developed Flexicoil truck is used. The new truck depends on a rugged, carefully calibrated, double-coil spring instead of a conventional swing-hanger to control lateral motion. Advantages of the Flexicoil truck are that it is simple, lightweight, has few parts and permits use of rugged, conventional-type, third-rail pick-up equipment.

The Flexicoil truck is equipped with journal boxes having special ears so that the third-rail shoe beam can be mounted between journal boxes along each side of the truck. The third-rail shoes hang from this beam.

When operating from the third rail, the FL-9 accelerates automatically. The engineer selects on a dial the rate of acceleration which will best avoid slippage yet permit reaching the desired speed in the shortest time. Once this setting is made he opens his throttle. The automatic control then regulates acceleration without the engineer manipulating his throttle back and forth to prevent slippage. In effect, the locomotive adjusts itself to track conditions in starting.

When the FL-9 operates as a diesel, auxiliaries such as the ac-driven traction motor blowers and cooling fans are powered by the engine. When the FL-9 operates from the third rail, a motor-generator set powered directly from the third rail supplies a-c power for the traction motor blowers and d-c power for lighting and controls. A special 600-v, d-c motor drives an air compressor during third-rail operation.

Structures leading into Grand Central Station permit a maximum axle loading of 58,000 lb. To keep within this loading, a 3-axle truck is used on the rear. The middle axle is an idler. The outer axles each have a traction motor. The front truck has two axles, each with a traction motor. This provides four traction motors per unit.

Train heat is provided by the conventional oil-fired, steam-heat generator.

There's no substitute for the FORGED crankshaft

Crankshaft forgings illustrated, left to right, for V-8 passenger car, diesel truck and heavy tractor engines

Crankshafts have been made successfully by other methods of fabrication and have proven to be *good enough* for certain non-critical applications — but for maximum dependability of the modern, compact, high compression, high torque engine a forged crankshaft is essential.

The forging process assures, to the greatest degree possible, uniformity and predictability of physical properties with a minimum variance from piece to piece or from one location to another in the same piece.

Wyman-Gordon has been forging crankshafts since the beginning of the internal combustion engine era and today produces more crankshafts for a greater variety of applications than any other company in the world. In a crankshaft there is no substitute for a forging, and in a forging there is no substitute for Wyman-Gordon quality and experience.

WYMAN-GORDON COMPANY

Established 1883

WORCESTER 1, MASSACHUSETTS
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FORGINGS OF ALUMINUM • MAGNESIUM • STEEL • TITANIUM

Use Starting Fluids Properly

Starting fluids can mean the difference between starting or not starting in cold weather. But there are do's and don'ts you should know—for your engine's safety and maybe yours.

COLD weather starting problems? How about using a starting fluid? These fluids will do a good job if properly used. They work on the principle of lowering the temperature at which the air-fuel mixture in the cylinder will fire. They'll pull it down to where you can get a start despite low compression temperatures.

Cold, viscous oil helps to cut cranking speeds. Slow speeds give more time for compression leakage past cold, unexpanded parts and more time for transfer of heat to cold cylinder and combustion chamber walls. So compression temperatures are low—frequently too low to ignite the fuel injected. Some aid is needed.

Research with starting fluids has shown two things—(a) Diethyl ether is one of the most practical fluids both functionally and costwise; and (b) for maximum effectiveness, it should be introduced in atomized form. Most starting fluids today contain diethyl ether, usually added in varying percentages to different carriers.

Various ways are used to get it into the engine. Several permanently-installed devices are made that pressurize the fluid and force it through piping to a nozzle or nozzles in the intake manifolding. Location is selected to get best possible distribution among the cylinders as atomized fluid is carried in by intake air.

Another method of atomizing the fluid is to package it in a pressurized aerosol-type container. The finely divided mist can be directed through the air cleaner or directly into the open intake piping where it is distributed with the intake air.

One maker of this type of starting fluid container, Spray Products Corp., has gone further by providing a holding bracket for the container and permanent piping to the intake manifold. Cans are replaced when empty. This type of installation has the advantage of remote control of starting as, for example, from the cab of a vehicle.

The Spray Products people point out that their fluid has a high percentage of diethyl ether for maximum effectiveness and that the remainder of the fluid, the carrier, is completely combustable. High propellant pressure is maintained right to the last fluid in the can. Thus, the product meets the two basic requirements of a starting fluid as mentioned.

SAFETY RULES

1. Have engine turning over before introducing atomized fluid so air flow carries fluid into cylinder.
2. Stop feeding fluid as soon as engine starts.
3. Feed a little more only if engine starts to die.
4. Use only closed systems in confined spaces since fluid is highly inflammable and can be harmful to personnel.
5. Never use starting fluid in engines equipped with manifold air-heating devices or with glow plugs.

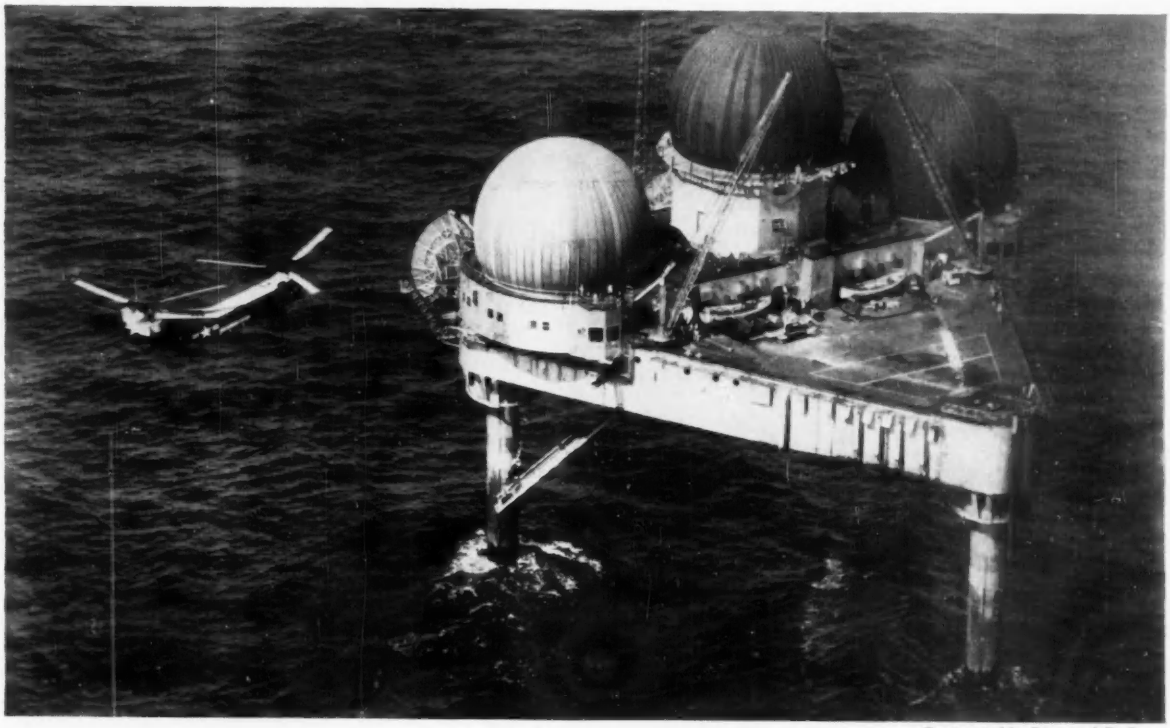
They also stress that with the availability and convenience of different methods of positive, effective and safe induction of starting fluids, there is no reason for some of the harmful and even dangerous practices common in the field.

Some operators dump liquid fluid into the intake system. They get starting fluid in bulk or in the gelatin capsules used in some of the permanent starting aid systems. They pour from a can or a cut capsule right into the intake. There is no atomization or control of quantity used.

Starting fluids are highly volatile. Some vapors get into the cylinder and fluid remaining in the manifold continues to vaporize even after a start is obtained. Vapors burn rapidly and when in excessive quantity the high rate of pressure rise produces a hammer blow on the piston that can break rings, ring lands and even the pistons. If excessive amounts of vapor condense on cold cylinder walls, lubrication is impaired and scuffing and scoring can take place.

Therefore, for safety, only highly atomized fluid should be used and only enough to get a start. Spray Products engineers feel that the engine should tell you how much fluid it needs.

The pressurized can has the advantage of always having a little reserve to maintain firing. Yet, positive shutoff and storage ability avoid the tendency to "use up" any remaining fluid. This helps avoid excessive use.



Constructed by Raymond-De Long

WHITE SUPERIOR DIESELS AND BENDIX INJECTION EQUIPMENT ON DUTY AT AMERICA'S FIRST LINE OF DEFENSE!

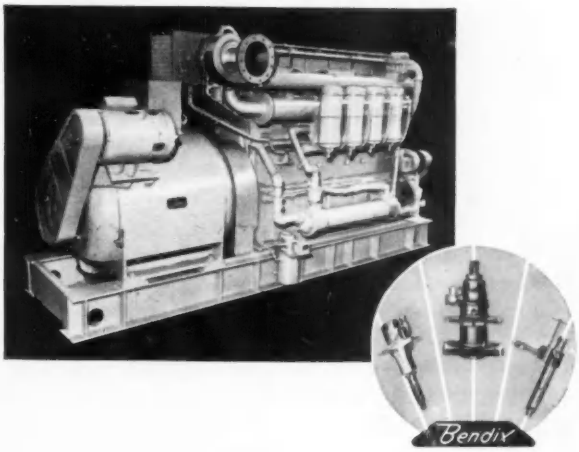
Today, out in the broad Atlantic stands our country's first line of defense—the Texas Tower. Specially trained Air Force personnel on these early-warning radar stations off the East Coast maintain a round-the-clock vigil, ready and alert to sound the warning that will start our air defense into action at the first approach of the enemy.

Here, at this vitally important outpost, equipment must be ready to function at a moment's notice. Here dependable performance over long periods is truly a must.

White Superior Diesel engines with Bendix* Fuel Injection equipment meet every requirement in generating the power for vital radar operation and also for the radio, communication, heating, lighting and ventilating equipment aboard additional towers.

It seems entirely logical that Bendix Fuel Injection equipment should be selected for this important job for Bendix is invariably the choice for fuel injection equipment when there can be no compromise with quality.

*REG. U. S. PAT. OFF.



SCINTILLA DIVISION OF BENDIX AVIATION CORPORATION, SIDNEY, N.Y.
Export Sales and Service
Bendix International Division, 205 East 42nd St., New York 17, N.Y.

Scintilla Division
SIDNEY, N. Y.

Bendix
AVIATION CORPORATION

After rebuilding, governors are tested and run-in in accordance with Woodward specifications. Governors are run long enough to reach normal operating temperature before being tested. Special stand for smaller governor models is attached to large governor test stand.

The Case of the PM Governors

Some owners of Macks with the Woodward PM hydraulic governors report governor trouble. Others report long, trouble-free service life with good speed regulation and excellent fuel economy. There must be reasons for this difference in experience. Here they are.

ASSIGNMENT — Track down differences in operating experience with Woodward Governor Company's PM hydraulic governor as installed on some Mack trucks and buses. Some users report excellent results. Find out what they are doing. Others can't get any service life. Find out why.

Start with the principal witness — the governor. It is a hydraulic speed droop type with a normal 6 to 1 range (600-3600 rpm). Separately controlled shutdown shaft and torque control are standard. It mounts on an adapter between the fuel pump and its drive and its power piston works directly on the fuel pump rack. Engine oil is used as the control medium. Both housing and baseplate are made of aluminum alloy with inserted bearing bronze bushings.

Several reports of good service were investigated. They showed one thing in common. All outfits had good preventive maintenance systems, well supervised. Schedules for lube oil changeout and filter replacement had been carefully worked out. They stuck to them. Some provided special filters in the oil supply to the governor. Several types were used.

Apparently, oil condition had a lot to do with governor service life. A pattern was shaping.

Checking Some Bad Actors

Next stop was A & D Diesel Service, Inc. They rebuild a lot of PM governors, principally for two large bus lines. Trouble was reported.

The owner, Jim D'Aversa, and his top governor man, Ralph Geist, were contacted. They have all the latest test equipment, tooling and knowhow necessary for all governor repairs and rebuilding. They qualify as expert witnesses.

What was the major trouble found? Dirt. Did it always produce the same results? Trouble, yes, but it showed up in many ways. Sometimes seizure would occur; perhaps you couldn't get a start; speed and power regulation was bad. But it all came back to dirt.

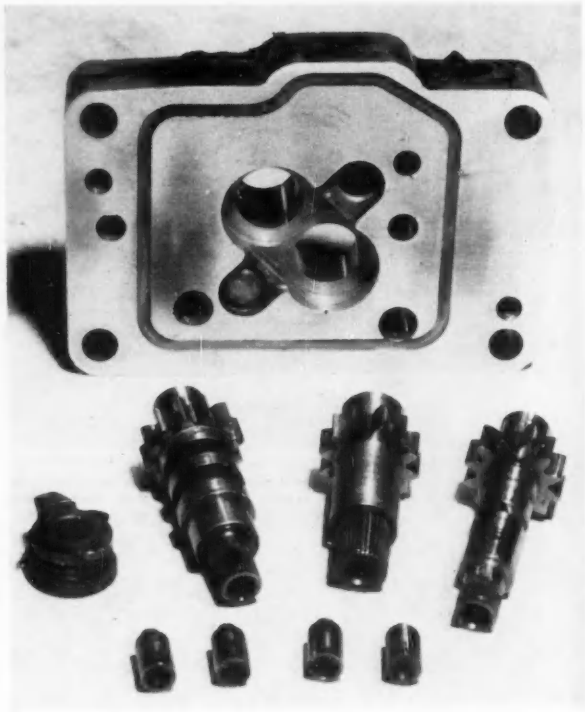
A secondary cause of trouble was improper installational procedures. This included rough handling. Evidence of this was shown. Rebuilt governors that had never run a mile on the road were back with real troubles.

Were they right when they left the governor shop? As right as you can get them. All rebuilt governors are tested on the governor stand. They are operated through the full range of speeds up to 3600 rpm and at temperatures simulating engine conditions of 180°F or better. They have to meet Woodward specs. They are then cooled by a flow of clean solvent and checked for complete mechanical freedom.

So something happens after they leave the shop.

Dirt—the Major Culprit

Complaints were examined. There was four major ones: (a) seizure; (b) no oil pressure; (c) poor governing action; and (d) worn parts. Repair records and governors awaiting repair were checked. They all point-



Governor Protection Notes

1. Keep the engine oil clean. Use the recommended filter elements or those with equivalent characteristics made by reputable manufacturers. Maintain filtering efficiency by a rigid schedule of element replacement and oil changes. Use every aid to determine the best interval between servicings for your particular operation. Work with the oil supplier, filter specialists or employ some method of used oil analysis. This not only protects the governor but the entire engine.

2. Insure governor protection. Many operators, all reporting minimum governor trouble, have installed an auxiliary filter in the oil supply line to the governor. Filters of the 20-micron rating class appear adequate although a 10-micron rating would be better. In sizing, flow capacity must be adequate for governor requirements. Flow during starting with the oil cold will be the governing factor. The governor requires 1 gpm for proper functioning during starting.

Don't forget to service the governor filter regularly.

Dirt has done all damage on governor parts shown here. Score marks in gear pockets of base (at top) are clear. They're removed with special cutter. Center row shows (from left to right) spring drive assembly; housing bushing seized on gear shaft; base bushing seized on gear shaft; scored gear shaft. Uneven light pattern on relief valve plungers (bottom row) indicates wear.

ed to one major cause for these troubles — dirt. It was brought in by dirty lube oil.

Take the case of seizures. In some governors, shafts of the drive gear and pilot valve gear had seized so hard in their bushings that the bushings turned in the baseplate and housing. Split off a bushing and you find the answer — scratches on the shaft and dirt particles imbedded in the bushing. Here's how it gets there.

Bushing and shaft are a close fit, particularly when cold. When the governor gets up to temperature, the aluminum housing and bronze bushings have expanded. The clearances have opened up and the larger dirt particles can enter. When the engine is shut down, contraction of the now-cooling housing and bushing traps the dirt between bushing and shaft. When the engine is started again, the damage is done.

Without oil pressure — no governing. Dirt causes this condition in several ways. Engine shutdown is done by spilling the control oil pressure. A plunger is moved down to unseat a ball check. If the plunger sticks down (dirt in its guide will do it) and holds the ball off its seat, you can't build up oil pressure. Same thing happens if dirt holds the ball check off its seat.

If the pressure relief valve sticks, oil will circulate around the pump and pressure does not build up properly. These and other plungers have to be a pretty close fit to seal properly and so dirt particles can make them stick. If it's an isolated slug of dirt, it can often be removed by flushing but if it's dirty oil, more dirt will be supplied.

Poor governing action can happen from the causes mentioned and wear too. All the parts have to work together and right. One direct cause of poor governing is binding or sticking of the servo piston. Another is not to give the piston enough oil at the pressure it needs.

In one case seen, gasket misalignment had started the trouble. Oil passes through the engine block and up through a hole in the governor base. The gasket between the mounting pad and governor base was misaligned and blocked the hole slightly. Dirt built up at the restriction. It wasn't long before the governor starved for oil.

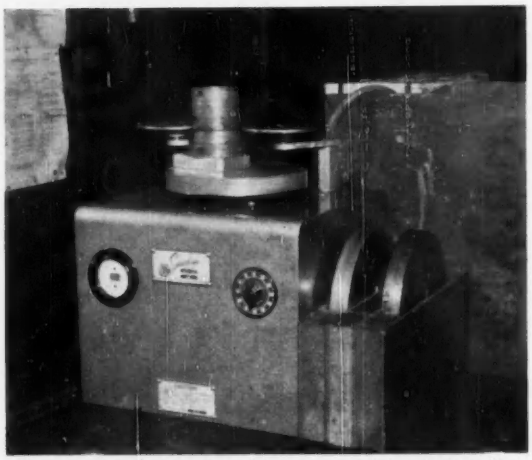
It figures that abrasive dirt causes wear. All closely-fitted parts wear or scratch. Clearances open up and the pressurized oil leaks. Linkages wear. Operation is bound to get sloppy.

The pressure pump is a good spot for wear. Dirt around the gears will wear both the sides and the outer contour of the gear pockets. Gears suffer too. Pretty soon, it's hard to get the right pressure.

The ball head has a spring drive and any jiggling movement is damped by two spring arms bearing on the sides of a recess. Dirt will speed up wear of these arms so that they break off. The damping action is gone.

Net result of dirt in the governor is trouble. It shows up in a lot of ways so the best thing to do is keep it out.

Oil holes are being drilled into annulus of bushing in governor housing to improve bearing lubrication. Bases are drilled too. Woodward drills new units and recommends that older units be modified in the field to their specifications. Housing is held in special vise at correct angle for drilling.



Bases and housings are lapped to assure good face-to-face fits. When gear pockets have been cleaned up, proper side clearance is obtained by additional lapping of the base. Here base is seen on Spiralap machine. Weight holds it firmly to lapping plate.

Now, About Installation

Can the governor take it? Yes, if you remember it's a governor and not an aluminum football. It doesn't take kindly to dropping, pounding or twisting. In many cases, damage is done before the governor is mounted or shortly after the engine is started.

One thing to watch is how the pump is mounted. Its base is flat but how about the mounting pad? If this isn't pretty flat, the pump can distort when the hold-down bolts are tightened. This can cause a bind and there is just about no way to check it at this point. So check the pad first.

Tighten properly. The two back bolts are hard to reach and have been found loose when the front ones were socked home. Again, there is a strain that can cause a bind.

In setting the injection pump and governor, you have to remove the servo plug and push in the servo piston against its stop. It looks like some use an icepick for the job. A pencil, soft wooden stick or something similar should be used.

Ralph Geist recommends a simple tool. Drill and tap the center of a spare servo plug. A 10-32 thread is fine. You can use a screwdriver on a regular screw head but a knurled knob would be better. Using your fingers, you can feel the stop as the piston bottoms. The screw holds the piston against spring pressure and the whole thing is a one-man job.

Watch installation on rebuilt engines. These governors depend on engine oil for lubrication as well as for a control medium. If you build up the whole engine including the governor, fill the crankcase and start the engine, the governor must rely on what oil it has in the bearings for lubrication. It takes time for the oil to get from the engine's oil pump, through the filters, and to the governor.

Governor priming is a problem. The safest way is to run the engine with the governor off until the oil starts coming out the supply hole. Then mount the governor. Until the oil reaches the governor, there is no governor control anyhow.

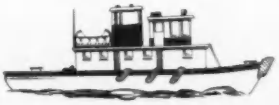
Protect the governor when doing certain jobs. One ticklish one is changing the timing gear on the fuel pump drive. In one case noted, the gear was removed by the prybar and hammer method. There was enough endplay in the shaft so that the pounding in the shaft drove the shaft's drive gear against the governor drive gear with sufficient force to spring something. The governor then had a bind.

Summing Up the Case

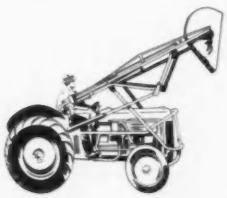
Evidence shows that when oil is kept clean and good mechanical practices used, the PM governors will do a good job for long periods. Evidence also shows that when these two requirements are not met, a lot of troubles can occur.

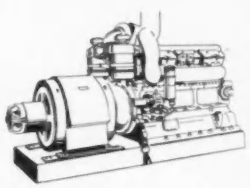
It might be argued that the use of light metal makes the governor more vulnerable to abuse. The answer is that no governor should be subjected to abuse other than that inherent in its operation. In this case, strength and rigidity are adequate for normal usage and the important advantage of lighter weight is gained.

Dirt and carelessness are the culprits in this case—not the governor.



YOUR SMALLER DIESELS CAN BE TURBOCHARGED, TOO ...AT LOW COST!





New AiResearch T-7 turbocharger is designed for diesels with naturally aspirated ratings of from 80hp to 130hp, will increase power up to 50%

A typical AiResearch T-7 installation will give a 900 lb. engine the power of a 1400 lb. engine with greatly reduced specific fuel consumption. It not only increases your payload, but, because it makes your diesel run cooler, it actually extends engine life.

Its low cost, small size, high output and extremely light weight make it the first practical solution to the turbocharging of low horsepower diesels.

Like all AiResearch turbochargers, the T-7 is air-cooled (making no demands on the cooling system of your engine), reduces noise and smoke and maintains sea-level power at high altitudes. Installed on your small diesel, it means smaller initial cost and lower operating costs than those of any naturally aspirated diesel of comparable output.

Your inquiries are invited.

BASIC SPECIFICATIONS FOR AIRESEARCH TURBOCHARGERS

MODEL	T-7	T-10	T-14	T-30
Output — lb/min. (Standard Conditions)	15-30	29-51	30-60	50-100
Diameter — in. nom.	8.5	10.0	11.5	15.1
Length — in.	8.5	10.5	12.9	14.7
Weight — lb.	24.0	40.0	95.0	112.0

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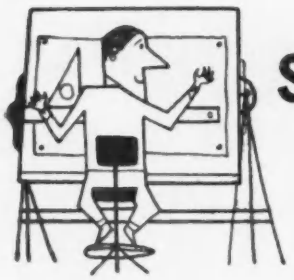


service section

Recent engine and equipment modifications, procedures and recommendations straight from the different manufacturers to you

Cat Diesel Starting Aids

Glow plug starting aids for Caterpillar Diesel Engines are designed to operate from a 24-volt source of current. Ordinarily, batteries supply this current. Glow plug arrangements are available which include a transformer. This transformer can be connected to 110-v, 60-cycle power source to energize the diesel engine glow plugs.

The transformer-equipped glow plug arrangement may also be used as a standby engine heater to keep the engine warm and ready for instant starting at all times. Provision must be made to turn this system off when the engine is running.

Alco's Maintenance Tips on Oil Bath Air Filters

As a service to the rapidly increasing number of oil bath filter users, Alco offers these maintenance tips for best operating results:

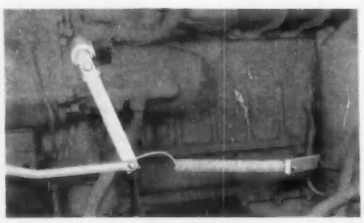
1. Do not attempt to read the sight glass (if used) to determine the oil level in the bowl while the engine is running.

2. Shut down the engine and let the filter oil drain into the bowl for 20-30 minutes before checking the oil level. Do this regardless of whether you check through a sight glass or with a dip stick.

3. NEVER open a filter bowl fill, drain, or inspection plug while the engine in running.

4. When filling or draining the bowl, use both fill or drain plugs. Add most of the oil to the lower fill pipe. If both fill plugs are opened, it is impossible to overfill.

Full details on the maintenance of these filters can be obtained from Equipment Bulletin #29, Engine Air Intake Filters — Oil Bath Type.



GM Hydrostarter Helper Spring

Whenever it is necessary to use an external linkage to the hydrostarter control lever, a certain amount of linkage drag may develop. Since the return spring in the hydrostarter motor may not have sufficient strength to overcome excessive linkage drag, it may not disengage the pinion from the ring gear after the engine has started.

To eliminate excessive over-running of the hydrostarter motor clutch assembly, and the possibility of an eventual burn-up, it is recommended that an external helper spring be attached to the linkage. This assists the hydrostarter motor return spring in disengaging the pinion.

Illustrated is a typical helper spring arrangement. One end of the helper spring is attached to the clevis pin that connects the external linkage to the hydrostarter control handle. The other end is attached to a bracket bolted to the fuel filter mounting bracket.

Cam Hole Cover Seal Kit for Roosa Master Pumps

Redesign of #145-1 "Racetrack" seal and #313 head-locating screw gasket has eliminated leaks at the cam hole cover.

The new #145-1 seal is now circular in cross-section and the copper gasket for the head-locating screw will be replaced by a circular cross-section "O" ring #1309 within a steel retaining ring #313-2.

These parts are packaged as "Replacement Cam Cover Seal Kit" #S2360 and may be used for pumps with or without automatic advance.

I-H Crankcase Front Cover Gasket

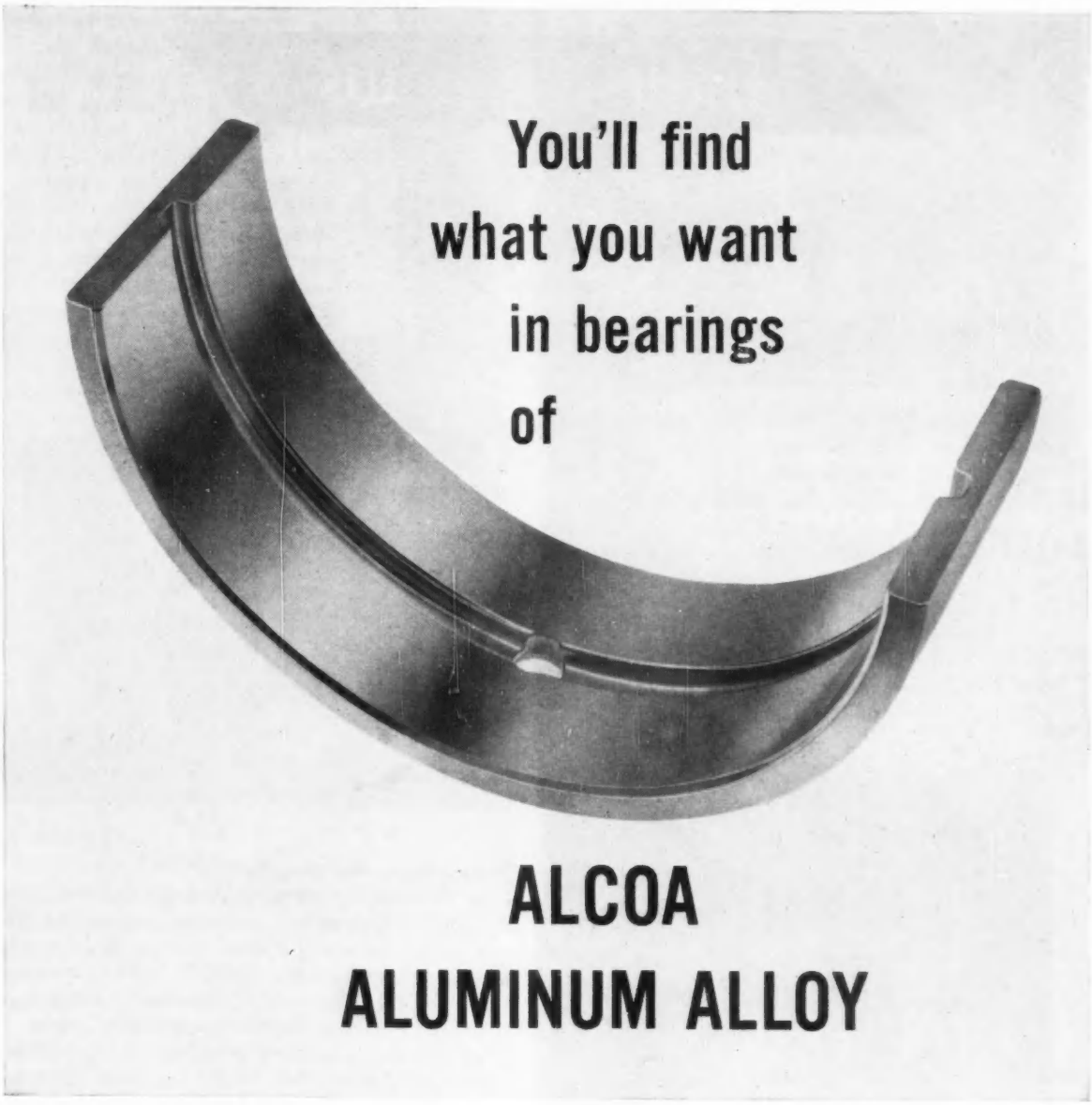
There have been reports from the field indicating that the wrong crankcase front cover gasket has been used for service on TD-14A (141 Series), TD-14 (142 Series) crawler tractors and UD-14A Power Units equipped with the engine balancer whenever an engine overhaul is made. Using the wrong gasket on engines equipped with balancer will stop lubrication to the engine balancer due to blocking the oil passage, causing serious damage to the engine balancer.

On all TD-14A (141 Series), TD-14 (142 Series) crawler tractors and UD-14A power units equipped with the engine balancer, use crankcase front cover gasket 274 398 R1 or R2 only.

On any unit not equipped with engine balancer, crankcase front cover gasket 262 620 R2 or 50 486 DC must be used. Crankcase front cover gasket 274 398 R2 can also be used on units not equipped with the engine balancer, but not gasket 274 398 R1.

Whenever engine gasket package 255 984 R94 is used for engine overhaul, be sure that the proper crankcase front cover gasket is included in gasket set, for use on units with or without engine balancer.

The engine balancer went into production on TD-14A (141 Series) serial number TDFM-41700 and UD-14A, serial number UDFM-39800.



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For more information on the unmatched combination of advantages in solid aluminum alloy bearings, call your nearest Alcoa sales office. Or, write to Aluminum Company of America, 1988-C Alcoa Building, Pittsburgh 19, Pennsylvania

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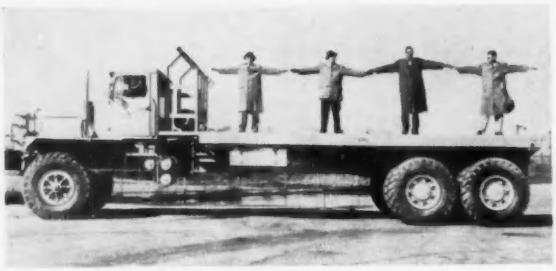


Truck For Oil Field Hauling

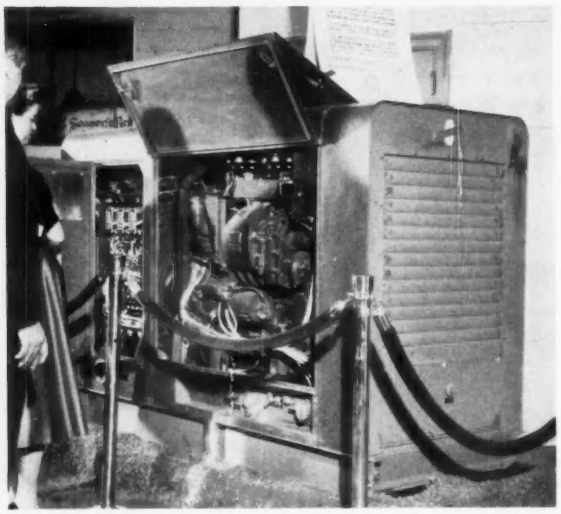
This huge Mack truck, is one of the largest off-highway trucks ever built for oil field hauling. It is one of five ordered by the government of Argentina for use in that country's oil fields. Weighing over 32 tons, the trucks are 40-ft long, 11½-ft high and 11½-ft wide. They are equipped with extra heavy-duty bodies and accessory equipment including 100,000-lb capacity Braden winches. They are powered with 300-hp diesel engines. The vehicles will be used to transport oil well drilling equipment.

ADS Hold Another Successful Meeting

Meeting of the Association of Diesel Specialists in Houston, Texas, on February 13-16 was very successful. Registered attendance of 72 included men from all over the country. One member came from as far as Fredericton, N. B., Canada. That's how worth while these meetings are considered.

The technical program was interesting and constructive. Also, service members and manufacturing members had opportunity to discuss mutual technical and business problems.

A customary feature of these meetings is a visit to a local fuel injection service shop, in this case, Magneto & Diesel Injector Service (see photo). Everyone picks up profitable ideas through these visits.



Precise Power For Missiles

Air Force, Army and Navy are using these GM diesel-driven sets to blast off and guide a variety of missiles. The sets are being turned out at the Houston, Tex., plant of Steward & Stevenson Services, Inc.

The unit shown is typical of those being used at Cape Canaveral, Florida and other missile launching sites. It is an all-weather, 45-kw, 400-cycle set with an electric load-sensing governor.

These units power missile control guidance systems, provide electricity for radar tracking devices and give necessary checkout power while the missiles are being readied for launching.

Before launching, certain units within the hull of rockets like the "Atlas" are also powered by diesel-generators so that stored up energy can be conserved for flight. Also, various testing procedures before blast-off require power.

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American Power Conference

About 30 sessions will be included in the program of the 20th anniversary meeting of the American Power Conference in Chicago Mar. 26-28.

Economic comparisons of the use of various fuels in the near future will be considered at one of these sessions. Discussions at the fuels session will deal with the economics of transporting energy; fuel availability and future power demand; the outlook for high energy fuels; and the energy aspects of underground gasification processes.

The American Power Conference, which is sponsored by Illinois Institute of Technology, in cooperation with 14 other colleges and universities and nine professional societies, will be held in the Hotel Sherman.

Pedrick Issues License On Formflex "Equalizer"

A non-exclusive license to make the Pedrick Formflex "equalizer" for sale throughout the world except in the U. S. and Canada has been issued. The announcement was made by W. E. Wilkening, president of the Wilkening Mfg. Co.

This license has been issued to one of the largest piston-ring manufacturers in Europe, Hepworth & Grandage, Ltd., Bradford, England. This company makes Hepolite pistons, rings, pins and cylinder liners.

As part of the license arrangement, Wilkening Mfg. Co. has provided the necessary blueprints to build the machinery to produce the "Equalizer". Hepworth & Grandage expect to be in production within about nine months.

Sales by Mack Trucks

Spector-Midstates has bought 50 Mack diesel tractors for long-distance freight hauling in the Midwest and East. All are cab-forward type with 170-hp Thermodyne engines.

Mack Trucks, Inc. also reports sale of four 30-ton, 335-hp LRSW diesel dumpers to Alcoa Exploration Company. They will mine bauxite in the Dominican Republic. Special aluminum bodies increase total payload by 16 ton.

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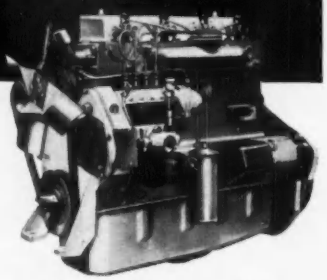

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Cooper-Bessemer Adds New Division

Formation of a new Electronics-Controls Div. was announced by R. L. Boyer, Vice-President and Director of Engineering for The Cooper-Bessemer Corp. It will be headed by Mr. R. D. Hamilton.

The reason for starting this new division is the anticipated trend to automation of power and compressing operations by pipeline, petrochemical and industrial plants served by C-B. Within the next 10 years, for example, it is expected that the major gas transmission pipelines in the U. S. will be automated.

C-B has been engineering satellite semi- and fully-automated systems for several years. By the use of the automated systems, it has now become practical to start up engine-driven compressors, load compressors onto the pipeline, regulate compressor capacity within precise limits, cut the compressor out of the pipeline and shut down the entire unit.

Some of the newest automated systems using C-B compressors provide for remote control regulation of an entire compressor station by microwave signals from distant control centers. No attendants are necessary. And since response of automatic controls to changing load condition is almost instantaneous, maximum economy in fuel and operating cost is more easily attained.

Diesel Buses To Peru

Ten transit-type diesel-powered buses were recently shipped to Empress Inca South America, Lima, Peru, for use as school buses. The 73-passenger buses made by the White Motor Co. far exceed safety standards of the National Conference on school transportation.

Safety features of this White Model 9218 bus include: safety sheet glass; seats bolted to the floor; moulded rubber safety center doors; non-slip step at door entrance; and driver position offering maximum visibility. The bus body incorporates special guard rails at the floor line and shoulder height to provide pupils maximum protection against injury from possible side-swiping.

Extra Classes At Euclid Service School

Anticipating a heavy construction schedule in 1958, extra classes on the servicing of Euclid equipment will be available during the winter and spring seasons. Training on all models produced by Euclid are available in both 1- and 2-week classes at the factory school in Cleveland, Ohio. Emphasis is placed on preventive maintenance, trouble-shooting, and overhaul procedures.

Metal Repair Firms Organize

Metal repair companies here and in Canada have banded together in the American Metal Repair Association. Member firms specialize in repair of diesel engines, gas turbines and other machinery. Objectives of this new trade group are to raise standards, promote research and protect customers through a system of licensing qualified firms.

Elected president is R. L. Rectenwald of Maintenance Engineering Corp. Vice president is S. John Oeschle, Jr., Metalweld, Inc. and George Jackman of Metal Locking Service is treasurer.

AMRA headquarters are in Pittsburgh and Charles A. Kenny is executive secretary.

New Drilling Tender Commissioned

A new drilling tender, the "Carl B. Anderson" has been commissioned at the Equitable Equipment Co., Inc. shipyard in New Orleans. The new package-type diesel-electric drilling tender is owned by the Anson Drilling Co. of Oklahoma City and New Orleans.

Power equipment on the tender includes two 850-hp Alco 251 diesels, three 550-kw, d-c generators, two 250-kw, a-c generators and four 625-hp, d-c motors.

The diesel-electric tender has several advantages. It permits deep drilling from a minimum-type platform, effecting savings on platform costs. In addition the tender with the bulk of the power equipment can be towed to safety at the first storm warning, leaving only enough men to secure the drill-site.

AERA Annual Convention

Washington, D. C. will be the scene of activities for the Automotive Engine Rebuilders annual convention May 11-14, 1958.

Through facilities of the Sheraton-Park Hotel, space for conference booths is available. Manufacturers of automotive replacement parts, machine shop equipment and related products are invited to participate.

Program sessions are being planned in harmony with the chosen theme: "Stay On Top With A Modern Shop." Those in attendance will hear leaders in the industry tell how to operate a profitable and modern shop. Technical tips and shop kinks will be offered in addition to the meaty panel discussions on pertinent subjects.

Corp of Engineers Buys Generator Set Worth $7 Million

The Corps of Engineers will buy diesel-generator sets worth over $7 million according to E. Chappe, vice president-sales, Kurz & Root Co., who will act as contracts administrator. A new plant facility has been established at Cedarburg, Wis., where these Harnischfeger diesel-driven Kurz & Root generators will be built. Contracts cover 1189, 45-kw, 60/50 cycle units.

Big Kenworths for Foreign Mining Operation

Orinoco Mining Co., a subsidiary of U. S. Steel Corp. has bought eight Kenworth Model 802-B rock and ore movers. They will be used for hauling iron ore from its Altamira-Rondon-Arimagua concessions to the ore-gathering system loading platform at Puerto Ordaz, Venezuela. This announcement was made by R. D. O'Brien, Vice President and General Manager of Kenworth Motor Truck Co.

The Kenworths are 48-ton units with a 32-cu yd struck capacity. Powered with 335-hp Cummins NRTO diesel engines, the 802-B's have Allison 3-speed torqmatic transmissions with torque converters. For down-grade speed control, the trucks have hydraulic braking.

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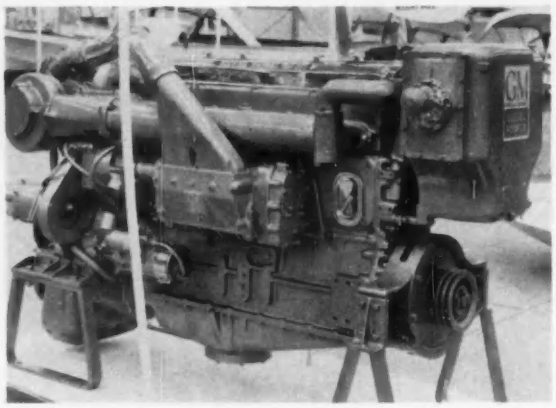


New Turbocharged GM Series 110 Marine Unit

Another marine diesel has been added to the GM Detroit Diesel Division's line of pleasure craft engines. This one, a 364-hp unit, was displayed publicly for the first time at the National Motor Boat Show in New York.

The unit is a 6-cyl, Series 110 model to which a single-stage, free-turning exhaust turbine has been added. This turbo-powered unit, with its improved combustion through better engine breathing, develops a substantial 75-hp increase over the pleasure boat rating of the non-turbo-powered unit.

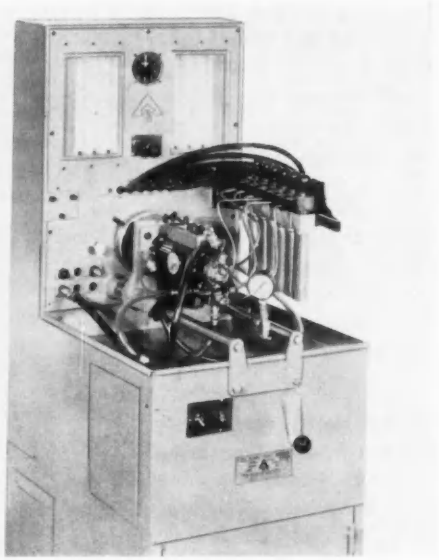
The turbocharger can be seen at the upper left-hand side of the engine. It adds a new high to the power range of GM Diesel's line of single engines for pleasure boat installations.

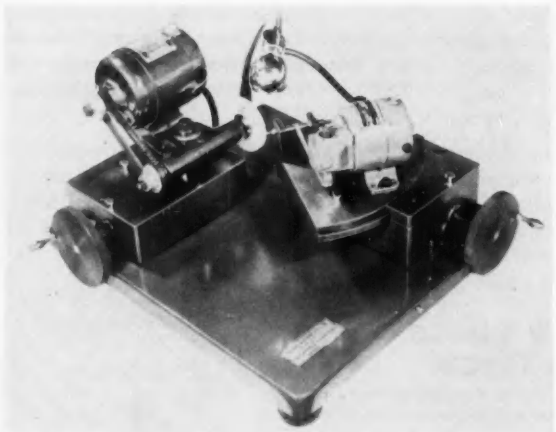
Roosa Master Calibrating Stands

Two diesel fuel pump calibrating stands for testing Roosa Master pumps are now available from Bacharach Industrial Instrument Co. The stands and accompanying specially-engineered accessories are factory approved to perform necessary calibrating tests in accordance with pump manufacturer's recommendations.

Photo shows the top or business-end of The "SP-600" stand. Its cabinet extends to the floor. It is used for testing all Roosa Master pumps. With suitable accessories, it may be also used for other fuel pumps on smaller diesel engines in trucks, farm tractors, and mobile power units.

The other stand, Model GP-500C, is also factory approved for Roosa Master pumps. It is suitable for testing all fuel injection pumps used in automotive diesel engines including those in heavy-duty trucks and construction equipment. For complete information and data, send for leaflet 933.



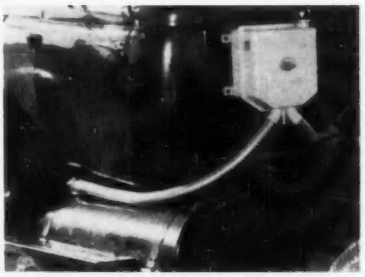


Nozzle Valve Grinder

Federal Machine Tool Co. has made available a diesel fuel injection nozzle valve grinder. This model FMT #1, was formerly supplied by the American Bosch Arma Corp., and carries their approval for reconditioning of nozzle assemblies for diesel engines.

The nozzle is driven in vee-rest by a separate motor to assure absolute concentricity with the cone. The grinding head is built to an exacting degree of accuracy guaranteeing concentricity, correct face angle and a high micro finish. It can be used with 110-v alternating or direct current.

The grinder is especially suited for use by injection equipment service shops as well as diesel truck, utility, shipyard, railroad, and engine builders repair shops which service fuel injection equipment.



Fuel Meter Stops Ticket-Padding Thefts

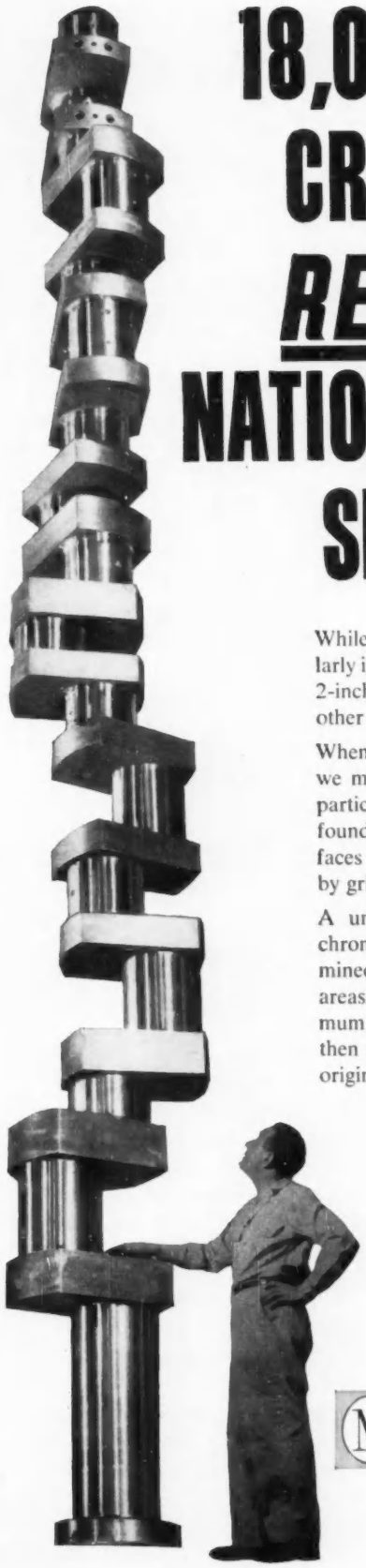
Ticket-padding thefts have been costing fleet owners million of dollars yearly. This trucking industry problem of fuel-receipt padding by drivers is said to be widespread and still growing.

To combat this the Sentinel Products Corp. has designed a tamperproof fuel meter which registers the amount of fuel actually pumped into the truck's tank.

The meter gives accuracy well within 1%, and enables the fleet owner to maintain a system of fuel control that is completely tamperproof. Fuel passes from the meter to the fuel tanks through asbestos-lined steel flexible hose. All joints between meter and tanks are self-locking, through the use of steel locking rings, and are leak-proof. All gauge plates, drain plugs, and fuel line fittings are positively sealed by Sentinel's trademarked and serially-numbered self-vulcanizing tape, so that at no point in the entire system may fuel be removed for unauthorized use.

Spin-Resistant Differential

An improved spin-resistant automotive differential is now made by the Warner Automotive Div. of Borg-Warner Corp. It provides increased traction on snow, ice, mud, and sand; reduces skidding on curves; reduces swerving on rough, crowned roads; and cuts tire wear due to wheel bounce. It is designed for use on passenger cars, trucks, tractors, construction machinery, military vehicles, and industrial lift trucks. It is readily interchangeable with most existing conventional differentials and provides smooth completely automatic operation under all kinds of traction conditions.



18,000 POUND CRANKSHAFT *REBUILT* BY NATIONAL FORGE SPECIALISTS

While National Forge specializes particularly in locomotive crankshafts, this 23-foot 2-inch compressor crankshaft was just another routine reconditioning job.

When this shaft arrived at National Forge, we made a thorough visual and magnetic particle inspection. After the shaft was found to be salvageable, all the bearing surfaces were prepared for chromium plating by grinding and grit blasting.

A unique plating machine deposits the chrome uniformly smooth to a pre-determined thickness—and away from fillet areas. After re-grinding—held to a minimum by accurate plating—the shaft was then finished ground and polished to the original specifications.

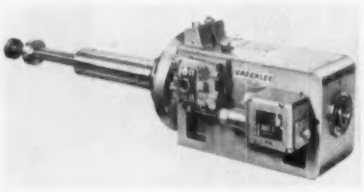
No other plating company has National Forge's experience in handling both new and rebuilt crankshafts. So, why not try National Forge Specialists on your next crankshaft rebuilding job?

NATIONAL FORGE & ORDNANCE COMPANY
IRVINE, WARREN COUNTY, PA.

new products

(*Continued from Page 45*)

Precision Boring Machine



Greenlee Bros. & Co., has announced a larger capacity Hydro-Borer, the model S-7. It is a precision borer for boring large assemblies or small individual pieces. The S-7 is specifically designed for mounting on workholding fixtures or large assembly jigs.

It features Greenlee's patented feed principle which enables it to bore to close tolerances with a good quality finish. It consists of a cylinder housing, oil reservoir, bearings, boring spindle assembly, control valve and spindle drive assembly. It can be equipped with manual, solenoid or air-operated controls.

C.A.V.

Depots and Service Agents in over 100 Countries

FUEL INJECTION EQUIPMENT DIVISION
of
LUCAS ELECTRICAL SERVICES, INC.
Head Office: 501 West 42nd Street, New York
Sales Office: 14820 Detroit Avenue, Cleveland 7, Ohio
West Coast: 5025-29 W. Jefferson Blvd., Los Angeles 16, California
Canadian Distributors:
Joseph Lucas (Canada) Ltd., Head Office: 11 Davies Avenue, Toronto 8, Ontario
Branch Office: 3401 St. Antoine Street, Montreal 30, Que.

A.P. 174817

Allis-Chalmers Expands Material-Handling Line

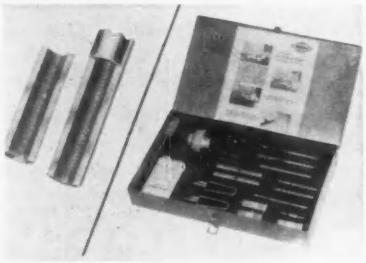
Two new industrial towing tractors, Model TG-45 and Model TG-50, have been added to the Allis-Chalmers Mfg. Co., material-handling equipment line.

Both models provide lower profile and the compactness necessary when used in areas where overhead clearance is often limited, as for example, at airports working under and around airplanes.

The new series is available with Allis-Chalmers diesel, LPG, or gasoline engines, all developing 75 hp. They give the units a pulling capacity of 90 to 100 tons on level surfaces.

Tractors have an overall length of 101-in., are 57½-in. high, 66-in. wide, and have an under-clearance at center of 9-in.

The company has also introduced power shift torque converter drive as optional equipment for their lift trucks. With this new feature, manual shifting of gears is eliminated in the lift trucks. Also available is a 2-speed power shift for lift trucks operating under unusually difficult traction or grade conditions requiring extra power to do the job.



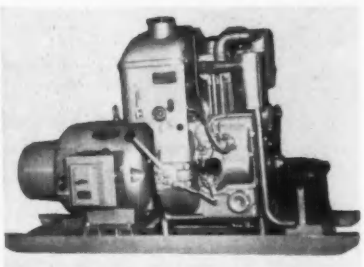
Valve Guide Knurling Tool

Cedar Rapids Engineering Co. has added the Kwik-Way valve guide knurling tool to its line of engine reconditioning equipment.

The new tool uses an entirely new method of bringing worn valve guides back to standard size. It can be used on guides worn as much as 0.006-in and is suitable for use on most engine models.

It can be hand-operated or powered by a standard ¼-in. electric drill equipped with a speed reducer. After knurling, a special piloted reamer restores the guide to standard size.

new products



New OEM Uses Kato Generators

Kato generators are now being used by another original equipment manufacturer for fabrication of electric power plants. The Crossfield & Nicholson Co. are driving these Kato generators with Deutz air-cooled diesels in their "Dieselight" power units. The generator sets are available from 2 to 250-kw.

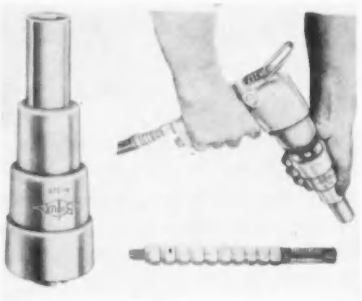
The generator set shown features a 5-kw, 3-phase, 60-cycle Deutz diesel-driven generator with direct-connected d-c exciter also made by the Kato Engineering Co.

New Maintenance Lapping Machine

A new model designed for maintenance lapping has been added to the Lapmaster line of precision lapping machines. The new Model 10 Lapmaster will consistently reface mechanical seals, valve seats, compressor discs, fuel injector parts and a variety of other parts to a precision flatness of 0.0000116-in. and with micro-finishes of 2 to 3 rms. It simplifies work so that inexperienced operator can turn out high-quality, close-tolerance work. Lapping cycles are automatically controlled by a timing clock.

New Sioux Pelican Nut Accumulator

Albertson & Co., Inc., have announced their new Sioux nut accumulator. Together with an impact wrench the Sioux Pelican can spin ten nuts off and back on again without their being touched by human hand. It will hold ten ¾ or 13/16-in. hex nuts, either 7/16 or ½-in. thread. The Pelican may be used with any air or electric impact wrench with ½ or ⅝-in. drive. It cannot be damaged by overloading. Nuts can't get dirty and it saves time spent in handling them.



(*Continued on Page* 52)

ROCKFORD

LONG LIFE Heavy-Duty POWER TAKE-OFF

ELIMINATES OUT-BOARD BEARINGS AND COUPLINGS

Small Spring Loaded

Heavy Duty Spring Loaded

Oil or Dry Multiple Disc

Heavy Duty Over Center

Power Take-Offs

Speed Reducers

The heavy-duty construction of ROCKFORD Oil Field type POWER TAKE-OFF bearing assemblies will handle side loads that formerly required the use of out-board bearings—with hangers and flexible couplings. Shaft deflection is no problem with this extra heavy-duty power take-off—when the load is held within specifications. You can reduce the over-all length of the engine and power take-off assembly by specifying ROCKFORD.

SEND FOR THIS HANDY BULLETIN
Gives dimensions, capacity tables and complete specifications. Suggests typical applications.

ROCKFORD Clutch Division BORG-WARNER
1301 Eighteenth Ave., Rockford, Ill., U.S.A.
Export Sales Borg-Warner International — 36 So. Wabash, Chicago 3, Ill.

CLUTCHES

people and plants

Appointments at Miehle-Dexter

E. L. Fester has been appointed general manager and D. Spencer sales manager of the Miehle-Dexter Supercharger Div. of The Christensen Machine Co., Racine, Wis. Miehle-Dexter makes superchargers for diesel and gasoline engines and industrial blowers. Mr. Fester has been vice president and plant manager of Christensen. Mr. Spencer was a sales engineer of the company.

E. L. Fester

D. Spencer

Purolator V-P Heads New Company Functions

J. P. Kovacs, vice-president in charge of research and development

J. P. Kovacs

of Purolator Products, Inc., has been given the added responsibilities of new product marketing and special engineering services. Mr. J. D. Abeles, president said the new organization signals vigorous expansion in industrial fields. Mr. Kovacs joined Purolator in 1929 as a design engineer.

Brush ABOE, Inc. Moving

The Petter Diesel Engine Div. of Brush ABOE, Inc., is moving to new and larger premises. As of March 1st, they will be located at 34-14 58th Street, Woodside, L. I., N. Y., not far from their present site. The move is the result of expanding sales and need for larger space to house engines and parts as well as bigger offices for increased staff.

Cooper-Bessemer Promotions

Promotions of R. W. Johnson to assistant N. Y. district mgr. and C. J. Havekotte to N. Y. mgr., have been announced by G. W. Edick, sales mgr., Domestic Div. of The Cooper-Bessemer Corp. Mr. Johnson will assist Mr. C. M. Reagle, N. Y. district mgr., in developing broader sales markets in the N. Y. territory. Mr. Havekotte assumes supervision of the N. Y. office staff and sales force engaged in domestic sales.

R. W. Johnson

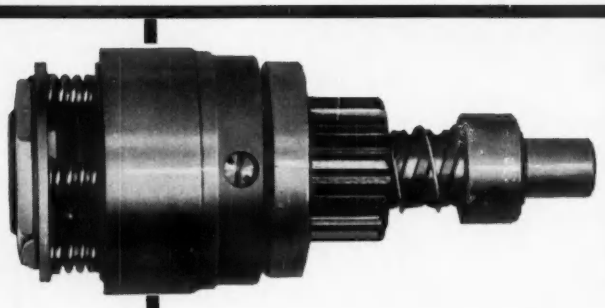
C. J. Havekotte

for

PERFORMANCE
ECONOMY
DURABILITY

specify

BENDIX STARTER DRIVES



In starter drives BENDIX means QUALITY. That fact, accepted by automotive men for almost half a century, is just as well-known to diesel engineers today. That's why the Bendix* Starter Drive is standard equipment on more diesel engines than any other make. It can be mounted more easily and in more positions. It requires no actuating linkage—the solenoid can be placed in any convenient position. It is simple in design, has fewer parts, needs fewer adjustments. No matter what your type of diesel, you'll be wise to specify and demand the Bendix Starter Drive for outstanding performance and economy. *REG. U.S. PAT. OFF.

Bendix-Elmira, N.Y.
ECLIPSE MACHINE DIVISION

Bendix
AVIATION CORPORATION

REDUCE LAPPING TIME TO A *Minimum* ON

Diesel Injector and Compressor Parts

LAPMASTER Model 10

Consistently laps to flatness within .0000116" and finishes of 2 to 3 RMS.

No down time for truing lap plate . . . conditioning rings automatically keep plate flat and true.

Handles parts up to 7" dia. . . . . any shape or form . . . any metal, ceramics or plastic.

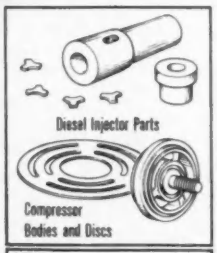
Automatically controlled lapping cycle.

Write for latest Lapmaster Bulletins

CRANE PACKING COMPANY

6448 Oakton Street, Morton Grove, Illinois, *(Chicago Suburb)*

In Canada: Crane Packing Co., Ltd., 617 Parkdale Avenue, N., Hamilton, Ont.



KIENE®

UNIVERSAL INJECTOR TEST STAND—

For Testing all Unit Injectors in One Fixture. Makes Plunger and Bushing Tests on all General Motors Unit Injectors.

KIENE HYDRAULIC TEST PUMP — For making all conventional Tests on Nozzles. Photo shows use with Universal Injector Test Stand.

KIENE CONNECTOR NUTS — For convenient Attachment of Equipment to Test Stand or Test Pump. All sizes Connectors available.

KIENE PORTABLE TEST EQUIPMENT

An entirely new and different product for the Diesel Industry offering features never before available in the field of Injection and Hydraulic repair and Servicing tools. Kiene Injector Test Stand and Hydraulic Pump give you all operating advantages of existing tools in addition to introducing many new and exclusive features. Kiene Products are Portable, Light Weight Compact, Rugged and Revolutionary in Design. They are engineered to give the Field Service Man adequate tools for on the job diagnosis and quick repair of valuable Diesel Equipment.

SAVE MONEY — SAVE DOWN TIME

Write for Bulletins KTP-50 and UTS-10

KIENE DIESEL ACCESSORIES, INC.

10352 PACIFIC AVE., FRANKLIN PARK, ILLINOIS

Metal Finishers Builds New Plant

Metal Finishers, Inc., will build a new plant at Kansas City, Kan. The building will be a one story masonry structure of 25,000-sq ft on about 2½-acres of land and will include railroad siding facilities. It will be in operation in early 1958.

The new facilities will chromium plate new and used cylinder liners for the railroad, pipeline, refinery and river boat industry by the exclusive Mecrome Process.

New GM Distributor for Northern California

Detroit Diesel Engine Div. of GM has named Williams & Lane, Inc. as new distributor of GM diesels in San Francisco Bay and Northern California area. This new corporation will handle Detroit Division's line of industrial, marine and truck diesels exclusively. Complete parts and service facilities have been established.

Heading the new company are J. R. Williams, president; N. L. Lane, vice president; and W. M. Glade, treasurer. Sales and service dealerships in nine cities in the Northern California area will continue under the new distributorship.

P. B. Jackson

Alcoa 34-Year Man Retires

P. B. Jackson, long associated with development of transportation applications for aluminum, has retired from Aluminum Co. of America.

A veteran of 34 years with Alcoa, Mr. Jackson joined them in 1923. Previously he had been a design engineer for Pierce-Arrow Motor Car Co. He assisted in designing the world's first locomotive diesel. Since 1927, he has specialized in application of aluminum to stationary, marine, locomotive, truck and tractor diesels.

For years he has also served our industry through active participation in technical societies, notably the SAE and ASME. He served in various capacities, one of the most recent being chairmanship in 1957 of the Oil, Gas & Power Division of the ASME.

DeLaval Separator Establishes New Branch

The DeLaval Separator Co. has opened a new district office in Ardmore, Pa. George G. Teren, Jr., who has been with the firm for 7 years, will take over as manager there.

New AAF Regional Manager

Frank K. Platt has been named central regional manager for all products of American Air Filter Company, Inc. Before this he was president of Air Engineering Co. Mr. Platt's headquarters are in Detroit.

(Continued on Page 56)

new literature

Full-Floating Shaft Couplings

A new brochure describing various applications of full-floating shaft couplings has just been issued by the Thomas Flexible Coupling Co.

The full-floating shaft couplings described in the brochure (bulletin 98) are used to connect shafts that are spaced far apart. They are recommended for cooling tower drives; fan, pump and compressor drives; heavy engine drives; paper-mill machinery; marine drives; and high-speed blowers and compressors.

IH Catalog Features Crawler Tractor

International Harvester Co. has issued a 20-page catalog on its TD-24 torque converter or gear-drive crawler tractor.

Profusely illustrated, the catalog is divided into 12 sections which describe features of the new crawler tractor in detail. Highlighted in the presentation is a schematic drawing of the TD-24 which graphically points up all the new features.

Basically, the new TD-24 is equipped with a 4-cycle, 6-cyl, 202-hp diesel designed for the roughest of earthmoving jobs.

Ductile Iron Digest

This 18-page illustrated booklet by International Nickel Co., Inc. describes new metal as strong as carbon steel with tensile strength up to 200,000 psi. This ductile iron can be twisted and bent without cracking . . . has as much as 30% elongation. The booklet shows how strength and toughness can be cast in tiny levers and huge engine frames.

Gas Turbine Noise-Silencing Brochure

How noise of a gas-turbine engine can be effectively silenced is explained in a 12-page brochure. This was recently published by the Industrial Sound Control Department of Koppers Co., Inc.

The brochure outlines ten easy steps on how to determine quickly what type of sound control unit is necessary to silence the turbine. This is possible, the company says, because Koppers gas turbine silencers are standardized and because the range of types and sizes are applicable to a wide variety of conditions.

Bearing Metal "Torture-Tested"

A 4-page folder recently prepared for the Bearium Metals Corp. presents evidence of the durability of Bearium Metal as a bearing material. The "torture test" described and illustrated in this folder is perhaps the most gruelling test to which any bearing material has ever been subjected. This should be of interest to anyone with a bearing problem.

Case Histories On Fuel Additives

A brochure entitled "Some Case Histories On The Application Of Fuel Additives To Inhibit Corrosion" has been released by R. S. Norris & Associates. It discusses some laboratory and micro-burner tests used to simulate full-scale operation, as well as application of fuel additives in diesel engines and other oil-fired units.

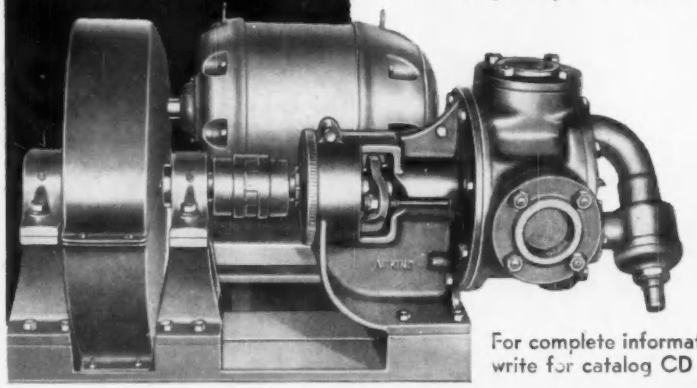
New Air Starting Motor Bulletin

Ingersoll-Rand Co. has published a new 20-page bulletin describing its complete line of air starting motors for diesel, gasoline and natural gas engines. It contains detailed specifications and mounting dimensions on 34 I-R models. About 500 engines by 25 manufacturers are listed, with the proper air starting motor shown for each engine. Instructions are also included for selecting the correct air starting motors for unlisted engines.

for RUGGED PUMPING
Specify VIKING Heavy Duty PUMPS

When jobs require rugged pumping, you can depend upon Viking Pumps. All are fast self-priming and positive in action. Models are built to handle liquids ranging from LP-Gas up to those of a viscosity of 2,500,000 SSU.

Choose yours in sizes of 10, 20, 35, 50, 90, 150, 200, 300, 450, 750 and 1050 G.P.M. Suitable for pressures to 200 psi on lubricating liquids, or 100 psi on non-lubricating liquids. Built of many types of metals and combinations of metals. Available in any type of mounting and power desired.



For complete information, write for catalog CD

VIKING PUMP COMPANY
Cedar Falls, Iowa, U.S.A. In Canada, it's "ROTO-KING" pumps

See Our Catalog in Sweet's Industrial Construction and Plant Engineer's File

Report On Required Torque Determination

A special report released by the Skidmore-Wilhelm Mfg. Co. explains how to determine the required torque for proper tightening of bolts according to specific requirements.

It tells which factors are the main ones to consider in determining proper torque. Other sections of the report cover torque-tension data, application of data, plus a practical example.

Folder Describes M-A-N Whisper Engines

An 8-page, illustrated folder published by American M-A-N Corp. describes in detail their "M"-engine line, including two new additions. All major engine parts are covered as well as the "M" principle of combustion and operation and why these multi-fuel engines can burn any type of fuel efficiently and at a low noise level.

1957 Supplements to Book of ASTM Standards

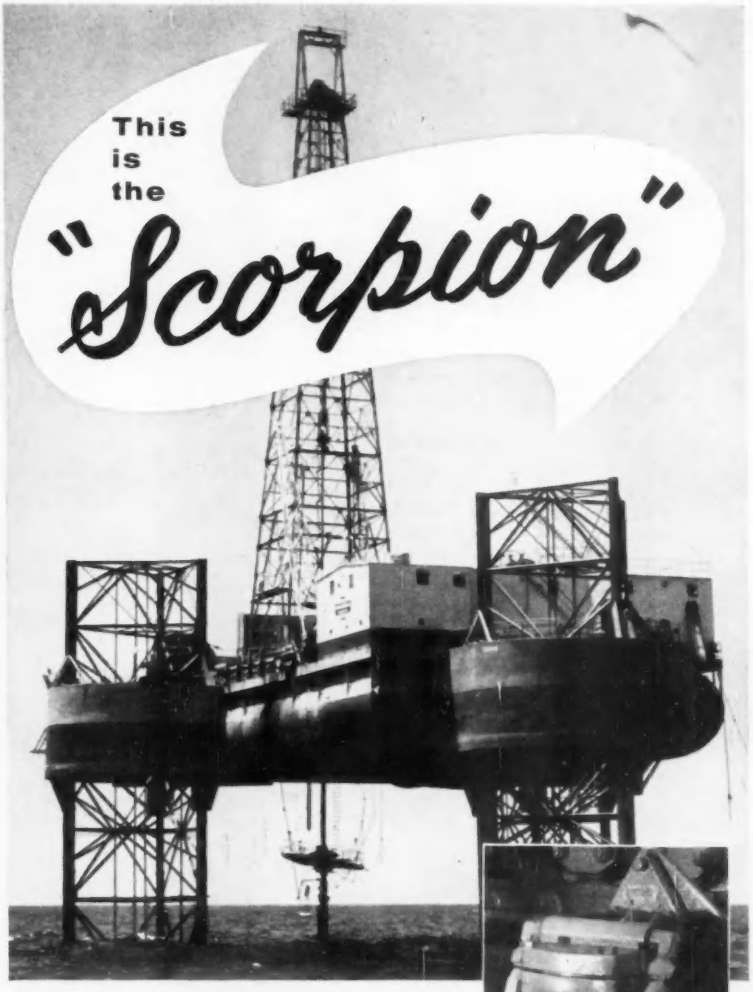
Seven 1957 supplements to the 1955 Book of ASTM Standards which is issued triennialy are now available. This book with its annual supplements provides industry, government, and commerce with a reliable source of authoritative, unbiased, and widely-applicable standards covering specifications, methods of test, definitions, etc., for engineering materials. Supplement 5 covers fuel, petroleum, aromatic hydrocarbons and antifreezes.

Euclid Film & Catalog

"Memo To the Winning Contractor . . . Why Twins?" is the title of a new 16mm, color and sound movie released by Euclid Div. GM Corp.

The film, featuring operation of Euclid's Twin-Power 24-yd struck capacity TS-24 Scraper, points up trend to twin-powered units for many kinds of earthmoving jobs. In interesting "show me" fashion, the movie spells out where, how and when twin power can be put to work advantageously. A 24-page catalog giving similar data is also available.

(*Continued on Page* 57)



Another Offshore Rig Using Dependable

NUGENT FILTERS

Here's a spot where the proven dependability of Nugent Filters can be a big factor in reducing down-time . . . can help provide more productive hours for making hole.

This is the "Scorpion"... a Le Tourneau Mobile Offshore Platform, built for Zapata Offshore Oil Drilling Co., Houston, Texas. Operating in Gulf Coast waters, the "Scorpion" utilizes four Buda 300 HP Engines to drive Le Tourneau Generators that supply electric power for the platform. Each engine is equipped with a Nugent *Full Flow* Lube Oil Filter to properly protect the bearings.

It pays to give valuable equipment the best possible filtering protection available. You get it with Nugent Filters . . . manufactured in a wide range of types and sizes. Write for information.

ESTABLISHED 1897

REPRESENTATIVES IN PRINCIPAL CITIES

WM. W. NUGENT & CO., INC.

3426 CLEVELAND STREET, SKOKIE, ILLINOIS

OIL FILTERS • STRAINERS • TELESCOPIC OILERS
OILING AND FILTERING SYSTEMS • OILING DEVICES
SIGHT FEED VALVES • FLOW INDICATORS

LOOK
for this SIGN

ASSOCIATION of DIESEL SPECIALISTS
A·D·S

when you need Specialized Service for your engines.
It identifies shops of Qualified Members of the
ASSOCIATION of DIESEL SPECIALISTS

It symbolizes Know-How, Modern Facilities and Ethics in Sales and Service of FUEL INJECTION EQUIPMENT, GOVERNORS and ALLIED EQUIPMENT. It guarantees—Work performed by FACTORY-TRAINED TECHNICIANS using FACTORY-APPROVED METHODS.

It is your assurance of—
THE BEST IN WORKMANSHIP AND MATERIALS

Write for a copy of the ADS DIRECTORY so that you can locate the MEMBER SHOP in your vicinity. Remember — ONLY THE BEST CAN QUALIFY

ASSOCIATION of DIESEL SPECIALISTS, INC.
For information contact: S. E. Franklin, Secretary
P.O. Box 1116, Wilmington, Calif.

GRIND CRANKSHAFTS IN THE BLOCK!
The Winona Istheklak Crankshaft Grinder has given fast, accurate service in the Automotive field for over 18 years. Now it's available to the Diesel field. With a new large hook, the standard grinder will now grind shafts up to 3½" in diameter in the block!
WRITE FOR DESCRIPTIVE LITERATURE AND PRICES.
WINONA TOOL MFG. CO.
WINONA, MINN. U.S.A.

new products

(*Continued from Page* 47)

Yates-American Offers Complete Heat Exchanger Line

A complete line of heat exchangers is being produced by Yates-American Machine Co. according to C. K. Olson, Vice President. Fixed-bundle sheet and tube heat exchangers were introduced a year ago. Now the Company has expanded to include design and production of steel and copper shell removable-bundle heat exchangers, and fixed-bundle aftercoolers and separators.

The new standard line of heat exchangers permits a broad range of applications.

Standard End-Face Seals

A new line of end-face seals in standard sizes is now being offered by the Chicago Rawhide Mfg. Co. Pre-engineered to meet the widest possible range of sealing requirements, the new C/R standard end-face seals are available in two complete series, long and short.

Specifications include ¾ to 4-in. shaft sizes; pressures to 500 psi; temperatures to 500°F; and peripheral speeds to 15,000 fpm. For special sizes and conditions other than those for which C/R standard end-face seals were designed, C/R will continue to develop new seals or to recommend existing designs.

Complete space envelope data on the new C/R standard end-face seals are presented in Bulletin EF-100 to permit size selection for incorporation in equipment designs.

Oakite Spray-O-Mat Cleans Oil Tanks

A new unit for cleaning oil tanks up to 12-ft long with small top openings has been introduced by Oakite Products, Inc. The Oakite Spray-O-Mat is a portable unit, weighs only 7 lb and measures less than 2½-in. in diameter.

It consists of a hydraulically-propelled rotary head which turns on a self-cleaning, hardened-stainless steel ball race. The spherical head is fitted with one wide-angle nozzle, and is slotted to provide 3-directional spray. An adjustable offset jet permits spinning of the spray head inside the oil tank.

The new unit requires a minimum of auxiliary equipment: pump; pipes and valves; solution and drain hose; and solution tank.

The unit is available at a nominal rental fee to users of Oakite cleaning compounds.

Liquid Ring Pump

A new self-priming liquid pump for transfer applications has been introduced by Goulds Pumps, Inc. The Fig. 2520 pump is lightweight and has a quick and positive self-priming action. It can handle air alone, liquid alone, or a combination of air and liquid. Minimum wear is assured by no rubbing parts. Easy access to interior is possible through casing cover without disturbing pipe connections.

(*Continued on Page* 55)

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new products

(*Continued from Page 52*)

Cycoil Oil-Bath Aftercleaner Redesigned

A completely redesigned Cycoil oil-bath aftercleaner has been introduced by American Air Filter Co., Inc. The new P-17 Cycoil is designed especially for collecting dust particles that might escape conventional dry centrifugals or viscous impingement filters. Its high collection efficiency makes it suitable for use in metal working shops where a high degree of air cleanliness is necessary.

The P-17 Cycoil is an automatic, self-cleaning dust collector that separates dust from the air as it passes through a viscous crimped-wire, fluid bed pad. The dust-laden air is mixed with the oil by means of a perforated plate over which the oil flows from a central distributing point.

High collection efficiency of the unit permits recirculation of cleaned air back into workroom. This reduces operating costs on large air-volume installations and eliminates discharge duct from collector to roof on small air-volume installations.

Bulletin 285A, describing the new Type P-17 Cycoil oil bath aftercleaner is available.

Gas-Air Check Valve for Compressors

A vacuum-controlled gas-air check valve for gas and air reciprocating compressors not equipped with automatic unloaders, has been developed by the Williams Gauge Co., Inc. It is for use in systems including reciprocating compressors with on-and-off operation.

The valve controls surge and "hammer" occurring when the compressor is in operation. The valve operates silently except when discharge valves of the compressor are leaking badly. In this case it acts as an alarm and pulsates with each stroke of the compressor. It is made in sizes from 1½-in. to 10-in. for pressures from 125 to 2500 psi and is designed for installation in vertical position only.

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people and plants

(*Continued from Page 49*)

Detroit Diesel Expands Production Facilities

Construction has started on a 289,000-sq ft addition to the GM Detroit Diesel Engine Div. plant in Detroit. This will increase total floor space to approximately 1,520,000 sq ft. There now are six main buildings and a laboratory on the Division's 120-acre site.

C. W. Truxell, general manager, said completion is expected next May. The new building will house all final assembly, testing, and shipping facilities.

An entirely new production system will be installed, including two new assembly lines for a total of five assembly systems. The layout revisions will be made without interruption of production.

Burgess-Manning Moves To New Plant

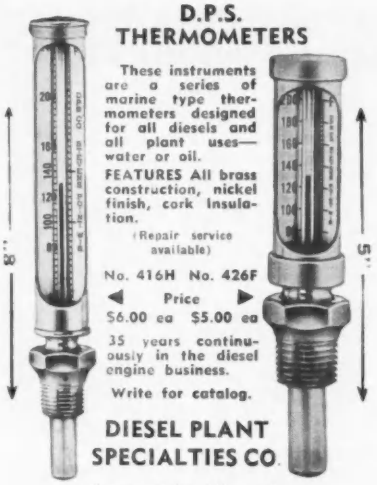
Burgess-Manning Company's Industrial Silencer Div. has moved to a new plant in Dallas. This move represents greatly improved facilities in all departments of operation. It includes an air-conditioned development laboratory in which studies can be made of field problems relating to noise, flow of gas in pipes and liquid separation.

A warehouse with efficient materials-handling equipment, a direct rail spur and truck-loading dock are features of the new facility.

News From Oakite

Two new technical service representatives have been inducted by Oakite Products, Inc. Donald R. Dutton has been assigned to Lansing, Mich. George D. Findlay, III is their new representative in Vermont.

Both men recently completed an intensive 8-week training program at Oakite's New York laboratories and in the field.



D.P.S. THERMOMETERS

These instruments are a series of marine type thermometers designed for all diesels and all plant uses—water or oil.

FEATURES All brass construction, nickel finish, cork insulation.

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35 years continuously in the diesel engine business.

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New Blood To Help Your Organization Grow!

Mr. Earl Schneider, *Service Manager for Western Machinery Company*, largest midwestern distributor of GM Detroit Diesels, has this to say:—"Over the years we have constantly added Bailey Graduates to our staff of trained mechanics. In our organization, dedicated to the best in service, they are a very valuable asset."

Throughout the years, industries over the entire nation have found the BAILEY TECHNICAL SCHOOLS the best source to obtain properly trained mechanics.

Let us staff your shop with properly trained mechanics . . . no cost to you or the graduate.

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For more details on any of these products, just fill in the postal card inserted in this publication.

new literature

(*Continued from Page 51*)

Folder On Mecrome Liners

A 4-page folder on the Mecrome process for chromium plating cylinders liners has been published by Metal Finishers, Inc. It is entitled, "Let's Put the Microscope on a Mecrome Liner." It illustrates how even distribution of oil-retaining pockets in the bearing surface eliminates hard and soft spots where liners contact piston rings. This reduces premature cylinder change-outs, increasing cylinder life and extending ring life.

Piston Ring Replacement Brochure

This 8-page brochure is designed to help engineers obtain maximum engine performance by careful attention to replacement of piston rings. It is entitled "Recommendations for Piston Ring Installations" and is published by the Piston Ring and Seal Dept. of Koppers Co., Inc. Procedures for checking pistons and cylinders are included in the brochure as well as helpful suggestions on the installation of new rings. Clearance tables for compressors and engines are also given.

Catalog on Fittings For Hydraulic Hose

Catalog 4440, issued by Parker Fittings & Hose Div., Parker-Hannifin Corp., describes reusable Hozelok fittings for use with rubber-covered, wire-braided hydraulic hose in sizes from 3/16 through 1⅛-in. inside diameter. Fittings are no-skive type which means that cover of hose need not be stripped off for assembly of fittings. This catalog lists hose and hose assemblies as well as giving instructions on how to make up assemblies.

Folder Describes Lube Oil Condition Indicator

A 4-page folder issued by The Gerin Corp., describes their new wear meter. It also tells how this meter is used to indicate continuously the condition of lube oil in an engine and gives advantages obtained from its use.

THE VERY FINEST PLUNGER AND BUSHING YOUR ENGINE CAN USE!

Precision Built for GM "71" Injectors

Low Valve: 60, 70, 80, & 90 mm

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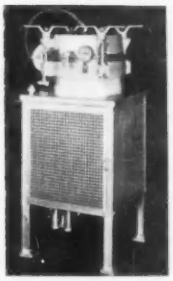
BARGAIN IN NEW DIESEL LUBE OIL CLEANERS

Brand new Hilco oil reclaimers. Connect directly to diesel engines or oil sump to remove all solids, sludge, acids, fuel dilution and water from lube oil. Deliver clean oil back to crankcase or to storage tank for re-use. Can be set for continuous or intermittent operation on up to 500 horsepower diesel engines. Especially useful in hard-to-reach locations where transportation of lube oil is a problem. Units are all-electric, require very little servicing. Designed to reclaim all oil each hundred hours of engine operation. Oil is heated and is pulled by vacuum thru the filter bed, which removes carbon and other solids and restores color. Oil passes over vaporizer for removal of fuel dilution and water. Oil returns to crankcase or to lube storage tank. Original cost, $1,500; your cost, $395. For more information, contact:



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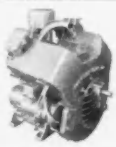
MODEL AC1:
Air-cooled, one-cylinder, four-cycle. 6.5 BHP @ 1800 RPM. Wt.: 220 lbs.

MODEL KBA-605: 7.5 KW permanent magnet generator mounted to AC2 diesel engine. Wt.: 550 lbs.

MODEL AC2: Air-cooled, two-cylinder, four-cycle, V-type 14 BHP @ 1800 RPM. Wt.: 350 lbs.



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CURRENT DRAW . (Holding) 1.7A. .95A. .28A. .25A.

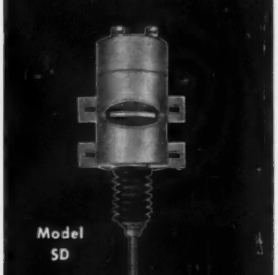
DUTY . . . . . Continuous

CYCLES . . Not to exceed 6 per minute

PULL . . Approximately 10 lbs. over ½" stroke

WEIGHT . . . . . 2¼ lbs.

Model SS



Model SD

MODEL SD

VOLTAGES . . . . (D.C. Only) 12V. 24V. 32V. 115V.

CURRENT DRAW . . (Pulling) 31A. 26A. 16A. 3.6A.

CURRENT DRAW . (Holding) .60A. .31A. .19A. .07A.

DUTY . . . . . Continuous

CYCLES . . Not to exceed 6 per minute

PULL . . Approximately 10 lbs. over 1½" stroke

WEIGHT . . . . . 4 pounds

SYNCHRO-START PRODUCTS, INC.

8151 N. RIDGEWAY AVE., SKOKIE, ILLINOIS

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IT'S A REAL ROCK DIGGER

Since they switched to a "Jimmy" Diesel

Want more work from *your* shovel? Then take a tip from T. B. Gatch and Sons, Inc., who operate a quarry near Churchville, Maryland.

They replaced the gasoline engine in this 1½-yard machine with a GM "6-71" Diesel a year ago. Results: 50% higher production. Two-thirds less fuel cost. Full capacity for work from half to full throttle. Less vibration and smoother operation that means longer life for boom, cables and other working parts. Says Senior Partner T. Ashby Gatch, "We can throttle the GM engine down and still retain ample power for the toughest rock digging. For boom swing we have the 'Jimmy's' quick acceleration, saving us time every cycle. There's no loafing on the job—this unit is now a real rock digger."

Taking tough jobs in stride is everyday work for GM Diesel-powered equipment. The 2-cycle "Jimmy" Diesel gives lightning response to power demands, operates on low-cost fuel and delivers years of dependable, trouble-free service. Specify GM Diesel when you order new equipment—ask your GM Diesel distributor about repowering old machines.

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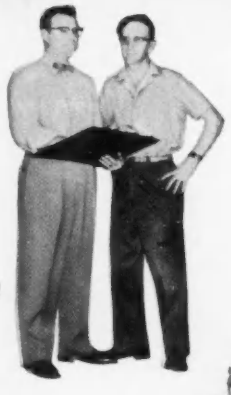
Parts and Service Worldwide

A GM "6-71" Diesel powers Northwest 1½-yd. shovel operating in quarry of T. B. Gatch and Sons, Inc., Baltimore, Md.

Maybe *you'll soon have this decision to make*



LUBRICATION CASE STORY ON THE NEW WORTHINGTON AT INDEPENDENCE, IOWA

Situation: Gene Williamson, plant superintendent, had a decision to make when the Independence, Iowa, Municipal Light Plant installed a new 3600 Horsepower Dual-Fuel Worthington last year. What lubricating oil to use? Other equipment in the plant was lubricated with STANODIESEL Oil M. Performance was excellent. Lubrication technical service performed by men with experience and training for the job likewise was excellent.

What was done: The decision was made to install STANODIESEL Oil M. Now after 3,780 hours of operation, there are no regrets. There are no signs of wear.

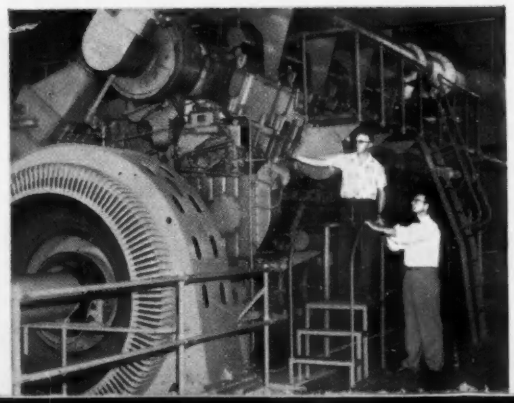
STANODIESEL Oil M is refined from the finest-quality base stock. Additives help the oil resist viscosity change, keep engine parts clean. Other additives control foam, make it possible for oil to reach and hold protective film on even the most difficult to lubricate parts.

What you can do: Get all the facts about STANODIESEL Oil M from your Standard Oil lubrication specialist. There's one near you in any of the 15 Midwest and Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 S. Michigan Ave., Chicago 80, Illinois.**

Quick facts about
STANODIESEL OIL M

- Keeps crankcase, pistons, cylinder walls clean.
- Combats deposit and wear problems imposed by use of economy fuels.
- Maintains film on difficult to lubricate parts.
- Eliminates fuel injector and pump sticking caused by deposits on injector barrel and plunger where fuel and lube oil mix.

You expect more from STANDARD *and get it!*



Running smoothly. Gene Williamson, power plant superintendent, and Standard Oil's Bob Wenger (right) check over new Worthington Dual-Fuel engine. Good lubrication technical service is one of the reasons Williamson decided upon STANODIESEL Oil M when engine was installed. Bob Wenger is well qualified by both experience and training to provide such technical service. He has been doing this work for nine years. In addition, he has an engineering degree from Iowa State and has completed the Standard Oil Sales Engineering School.